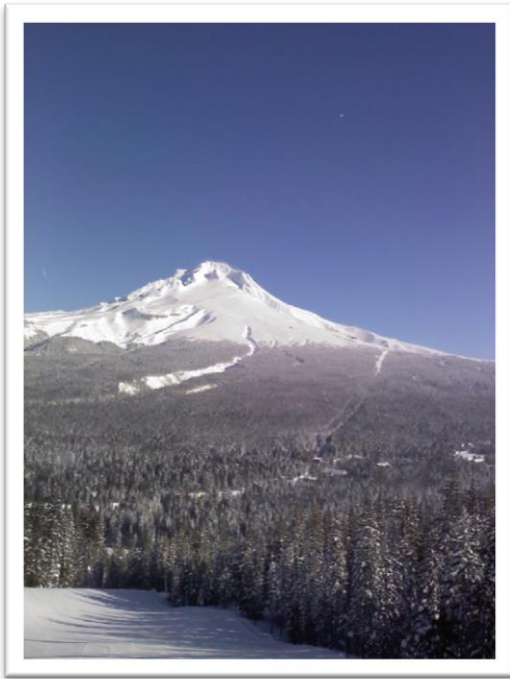




Mount Hood National Forest

2015 Travel Analysis Report



June 2015

Table of Contents

Mount Hood National Forest	1
2015 Travel Analysis Report	1
June 2015.....	1
Executive Summary	3
1. Introduction	6
Background	6
Scope of the Analysis.....	10
Objectives of the Analysis	10
What this Analysis Does <u>NOT</u> Do	11
The Analysis Process.....	11
Interdisciplinary Team Members and Contributors	15
2. Describing the Situation	17
Existing Road System.....	17
3. Issues.....	24
Economics	25
Current Situation.....	25
Scenarios.....	27
Desired Future Condition.....	31
Access Needs	31
Current Situation.....	32
Public Input	34
Recreation.....	36
Heritage	39
Vegetation Management.....	43
WildFire and Fire Suppression	45
Desired Future Condition.....	46
Environmental Issues	47
Current Situation.....	47
Aquatics and Watershed Resources.....	48
Fisheries	51
Water Uses	55
Wildlife	56
Botanical Resources	66
Climate Change	71
Desired Future Conditions for Natural Resources	72

5. Opportunities	73
Economic Goal	74
Travel Analysis Implementation.....	74
Strategic Planning	75
Road Maintenance	77
Road Closures and Decommissioning	78
Site-Specific Planning	79
Inventory & Monitoring.....	80
Glossary	81
Bibliography.....	83

Executive Summary

The Travel Analysis Process (TAP) for the Mt. Hood National Forest (MTH) is the latest in a series of travel management analyses dating back two decades. The Mt. Hood National Forest has undergone enormous change since 1990. With implementation of the Northwest Forest Plan in 1994, the Forest went from a program of intensive timber management providing an annual timber harvest of about 369 million board feet, to a program composed of riparian and late-successional reserves with a harvest of 30 million board feet. This change reversed decades of road system expansion and led the Mt. Hood to evaluate the strengths and liabilities of its entire road network.

The Chief of the Forest Service reaffirmed the agency's commitment in 2012 to completing Subpart A of the travel management rule, and directed that a science-based travel analysis process, a key first step towards completion of Subpart A requirements, be completed by the end of 2015. To complete the TAP, individual units have been encouraged to build upon road-related analyses they have completed in the past, particularly the Roads Analysis (RA) of the early 2000s and Access and Travel Management (ATM) of the 1990s. For units that have conducted both previously, Forests were to assess the degree to which they adequately comply with Subpart A and fulfill its requirements. This initial step helped to determine the appropriate scope and scale of the new TAP so that it could be used to build upon previous work and minimize redundancy.

In 2001 the Mt. Hood initiated their Roads Analysis, completing it in 2003. It was conducted in accordance with Forest Service Manual 7700, and publication FS-643, "Roads Analysis: Informing Decisions about Managing the National Forest Transportation System," and can serve as the basic analysis requirement of Subpart A. In 1999 the MTH analyzed the entire Forest's road system with the ATM. It was conducted to meet goals and objectives of the Forest's Land and Resource Management Plan of 1990, as amended by the Northwest Forest Plan of 1994. Both the RA and the ATM served as the foundation and starting point of the TAP for the MTH.

But the 1999 ATM and the 2003 RA were not the only analyses of the Forest's road system that have been completed. Forests embarked on landscape-scale assessments prior to the ATM known then as Watershed Analysis. These assessments also identified road-related concerns and restoration opportunities across the MTH, and spawned an advent of road-related projects for the next decade, including reconstruction, culvert replacements, closures, and decommissioning on many miles of road to reduce unwanted impacts to natural resources.

During this period, the 1996 flood occurred, which caused widespread damage to the Forest's road system. Much of the damage was repaired, particularly to arterial roads and primary haul routes. But decisions were also made not to repair flood-caused road damage, and instead decommission some of the more heavily damaged roads, focusing on those that had been identified as being a public safety concern or high risk to natural resources. This resulted in more than 130 miles of road to be decommissioned in 1998, including nearly all of the road system in the Fish Creek watershed, where biologists had been implementing restorative actions for years to revive a small population of coho salmon that still spawned and reared there.

Then for the decade following the 2003 RA, its recommendations along with those of the 1999 ATM were used to reinvigorate a focus of diminishing road-related impacts to aquatic species and water quality. There followed in nearly every year after an Environmental Assessment that identified roads to close or decommission. Road-related restoration decisions were signed in 2003, 2006, 2007, 2008, and 2009. In 2006 the Bull Run Decommissioning Decision eventually resulted in 136 miles of road to be decommissioned in the city of Portland's municipal watershed, co-managed by the Water Bureau and MTH.

Then in 2010, The Legacy Roads Strategy identified another process to begin reducing adverse hydrologic impacts of the Forest's road system. The process was intended to develop plans for individual watersheds in increments over a six year timeframe. Two Increment plans have been completed to-date, the first in 2009 and the second in 2011. A third plan is currently in development.

The roads that the Increment efforts have identified for closure or decommission are being pursued opportunistically as funding becomes available, or will be delayed to provide access until other forest management activities have been completed first. Because of limitations to funding however, implementation of individual projects identified in the Increment plans could take more than a decade to be completed.

There were approximately 3,850 miles of road on the Mt Hood National Forest in 1990. Today there are about 2,900 road miles, of which 92 percent remain open to the public. More than 800 miles of road have been decommissioned from the Forest's road system since the early 1990s. A large proportion of those miles were decommissioned to diminish the impacts of high risk road segments to aquatic and water resources.

The ATM indicates that nearly another 160 miles are scheduled to be decommissioned, and another 612 miles are scheduled to be closed to motorized use but retained for future needs. Once again, many of these miles were identified because they posed a moderate or high risk to aquatic and water resources. A little more than 63 miles of road have been converted to trails, primarily for OHV users. Areas on the MTH designated for OHV use were defined during the development of Subpart B of the Travel Management Rule, which was completed in 2010.

Between 1989 and 2003 the budget for annual road maintenance on the MTH declined about 60 percent. Over the last decade it has continued to decline steadily by 2 to 5 percent every year. Restoration dollars to fix, stormproof, or decommission roads has also been declining. Since 2010, restoration dollars to diminish environmental impacts from roads has fallen 90 percent. The road system continues to age, and many of the drainage structures such as bridges and culverts are older than what they were designed for. Many are faulty or function poorly.

Recent trends show that appropriated funds that are distributed to the MTH provide only enough to maintain or make repairs to about 15 percent of the road system annually. There are however, other dollars that can become available during any given year to help supplement additional need. These include monies generated by the sale of timber, legacy road funding, retained receipts from stewardship contracts, Emergency Relief for Federally Owned Roads, road use permits, and potentially Secure Rural School funds.

Visitor use has increased exponentially over the last 2 decades on the MTH and the trend is projected to continue. There are more types of users than ever before, and many people want to access the MTH for many different reasons. How will the MTH be able to afford to maintain and upgrade the road system for the future when budgets are declining, yet the user base of the Forest is expected to rapidly increase as the nearby urban population expands over the next decade?

Now is an opportune time for the MTH to be conducting the TAP. While it is considered to be another iteration of road assessment for the Forest, one that is additive to the last two decades of previous work, it is more about defining a road system for the future. A future road system on the MTH should be one that balances access needs for our benefactors and provides them with options, while continuing to diminish unwanted environmental effects and lessen costs. For the MTH, several options have been explored that could meet those three objectives, while also being responsive to the highly variable input received from our customers, the public, and stakeholders.

The first option is to continue on the path set forth by the 1999 ATM, the 2003 RA, and the 2010 Legacy Road increment strategy, but tweaking it a little to adjust to certain conditions that have changed over the last decade. Then, by projecting that scenario out to its planned culmination, see where we could expect to be economically.

The second scenario would be to build further on the outcome of the first scenario in an attempt to achieve an economic goal that could be expected to be more favorable at culmination. The second scenario would optimize more strongly a distribution of road miles in the lower maintenance levels. It could be achieved by several means. One, roads with lower access needs but higher resource risks could become additional candidates for a change in the maintenance level, closure, or decommissioning. Second, roads with lower maintenance levels that have a low access need and a low resource risk could be converted to subordinate maintenance levels.

The maintenance budget of the first scenario would be about \$400M less annually, yet still fall short (by about \$200M) of meeting the economic goal of having an annual maintenance burden that was within plus or minus 20 percent of the previous 5-year average budget. If the Forest were to continue forth with that strategy, it would need to generate more revenue to pay for the difference. The second scenario could meet the economic goal and reduce the annual budget by about \$600M at culmination, but it likely would not be in balance with access needs for recreation and the general public, traditional uses, vegetation management, fire suppression, special use permits, cooperators, and special forest products.

This travel analysis is not an official Decision, but rather a compilation of information useful for informing future analysis and formal Decisions at the local level about road management. The TAP for the MTH is intended to provide some flexibility for the future, and not be overly prescriptive. Details of the culmination of outcomes, the phasing of implementation, and capturing opportunities have been left for the local units (i.e., Ranger District) to determine at the project-scale. Also, this TAP is not intended to be an analysis of effects. Effects would be analyzed at the project-scale when the NEPA process is initiated.

1. Introduction

Background

Expansion of the road network on the Mt. Hood NF had peaked by 1990 to about 3,860 miles (USDA 2003). Most of the system was built between the 1950s and late 1980s to primarily support timber management. Since that time, however, needs for and uses of the system have shifted as timber harvest on national forests has declined considerably and other uses, such as recreation have grown. Substantial and steady decline of funding to maintain the system accompanied the reductions in timber harvest.

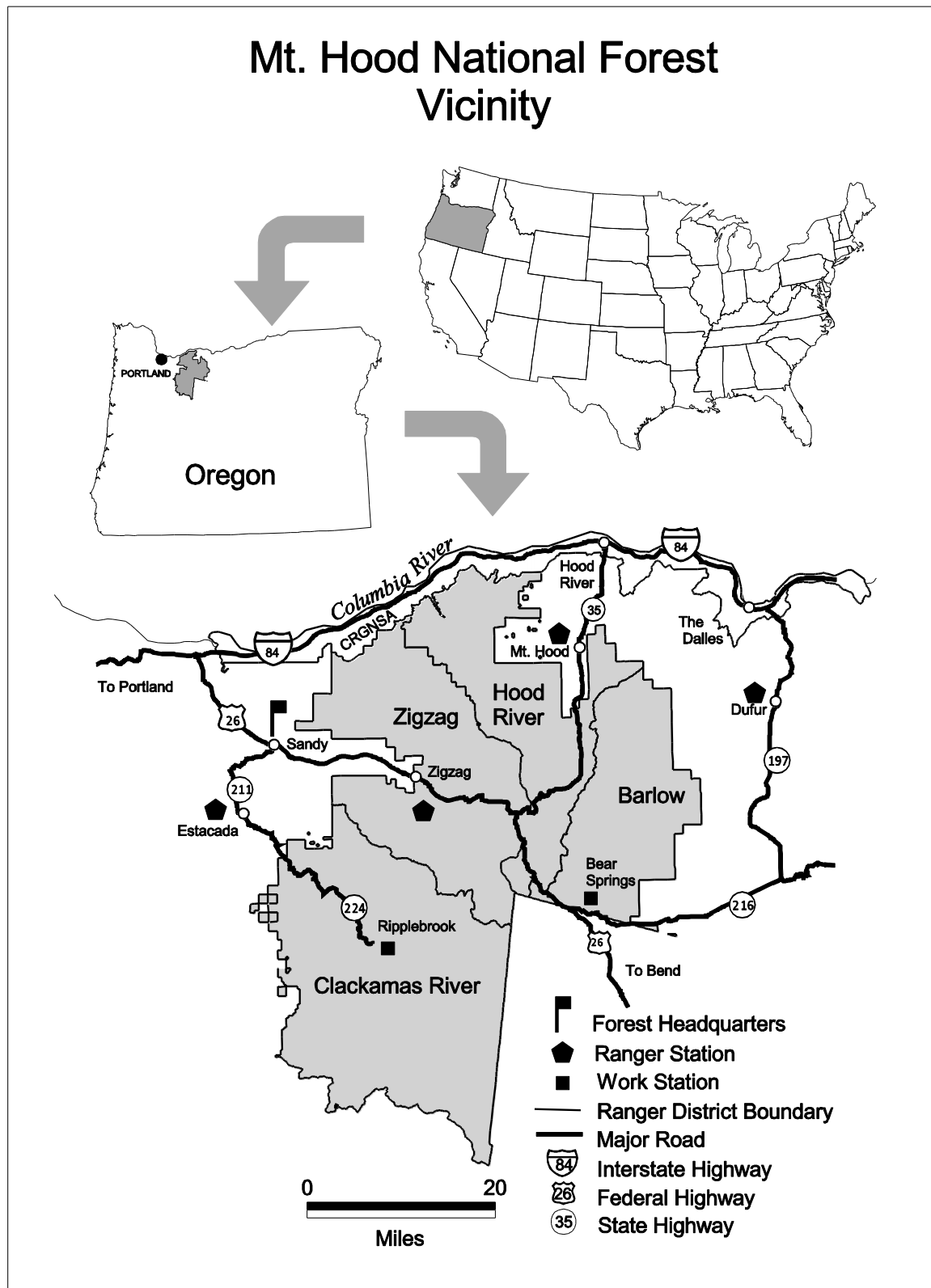
Like many National Forests, the Mount Hood (MTH, Figure 1) has conducted assessments of its roads iteratively for at least several decades. As far back as the mid-1980s and early 1990s, a small number of spur roads were subsoiled to alleviate soil compaction, and watershed improvement funds could be acquired to mitigate highly eroded conditions or poorly functioning drainage structures on individual road segments. While these endeavors were not yet widespread, they were precursor examples of the effort on the MTH early on to address road related impacts to soils, aquatic, and water resources. There was an ethos on the Forest back then to proactively pursue and implement restorative activities.

With the advent of the Northwest Forest Plan in 1994, the MTH embarked on landscape-scale assessments known then as Watershed Analysis. These assessments identified restoration opportunities across the MTH, including road-related concerns. They spawned an advent of road-related restoration projects for the next two decades, including reconstruction, culvert replacements, closures, decommissioning, and conversion to trails on many miles of road to reduce unwanted impacts to natural resources.

Because the Northwest Forest Plan resulted in such a marked reduction of timber harvest related jobs, President Clinton in 1996 created the Jobs-in-the-Woods program as one way to offset the impact to timber dependent communities. On the MTH, this led to one of the first large-scale efforts to reduce road-related impacts as prescribed by the Watershed Analyses. Dozens of road miles were either closed or decommissioned using labor from displaced workers. One of the first was the Collawash and Upper Clackamas Watershed Restoration Environmental Assessment (1996), which prescribed about 54 miles of road closures.

Also in 1996 a major flood event occurred, which caused widespread damage to the Forest's road system. Much of the damage was repaired over the next few years, particularly to the arterial roads and primary haul routes. But decisions were also made not to repair flood-caused road damage, and instead decommission some of the more heavily damaged roads, focusing on those that had been identified as being a public safety concern or high risk to natural resources. This resulted in more than 130 miles of road that was decommissioned in 1998, including nearly all of the road system in the Fish Creek watershed, where biologists had been implementing restorative actions for years to revive a small population of coho salmon that still spawned and reared there.

In 1999, the MTH analyzed the entire Forest's road system, completing its Access and Travel Management Plan (ATM, Appendix 4). It was conducted to meet goals and objectives of the Forest's Land and Resource Management Plan (LRMP) of 1990, as amended by the Northwest Forest Plan of 1994. The ATM was not a decision, it was guidance. It provided the strategy, goals, and objectives for managing the Forest's travelways in a manner that is consistent with sustainable use of forest ecosystems and maintaining or restoring watershed health. A primary element of the ATM was to designate each road an operational and an objective maintenance level. This defined the principle use of a road, how it was going to be maintained, and what its fate was intended to become at some point in the future.

Figure 1. Mt. Hood National Forest Vicinity Map

Next, the Forest began conducting their Roads Analysis (RA, [Appendix 5](#)), which they completed in 2003 for maintenance level roads 1 through 5. It was conducted in accordance with Forest Service Manual 7700, and publication FS-643, "Roads Analysis: Informing Decisions about Managing the National Forest Transportation System." For the MTH, this effort was another iteration of analyzing the access needs and resource risks of the road system. Once again, the RA was not a decision. It prioritized road-related restoration opportunities with an objective, science based analysis comparing multi-resource concerns with multi-user needs.

What followed afterward was a decade of continuing effort to achieve the goals of the ATM and the RA. The principle objective on the MTH remained reduction of road-related impacts to aquatic and water resources, though sometimes benefits to other resources such as wildlife habitat were the main objective. In nearly every year after the RA, there was an EA prepared that identified roads to close or decommission. Road-specific restoration decisions were signed in 2003, 2006, 2007, 2008, and 2009. Two very notable decisions entailed road decommissioning in the Bull Run, which resulted in 136 miles of road to be decommissioned in the city of Portland's municipal watershed, co-managed by the Water Bureau and MTH. Road-related restoration also was included as project work in a number of timber sale and stewardship contracts completed over the last decade.

Then in 2010, The Legacy Roads Strategy ([Appendix 6](#)) identified yet another process to reducing adverse hydrologic impacts of the Forest's road system. It developed plans to close, decommission, or convert roads in certain watersheds in increments over a six year timeframe. Two Increment plans have been completed to-date, the first in 2009 and the second in 2011. A third plan is currently in development. The Legacy Roads strategy guided the Increment Decisions, and was the process for prioritizing watersheds where road-related restoration efforts should focus.

Roads that the Increment efforts have identified for closure or decommission are in the process of being pursued opportunistically as funding becomes available, or are delayed to provide access until other forest management activities have been completed first. Because of limitations to funding however, implementation of individual projects identified in the Increment Decisions could take more than a decade to be completed. Partnerships have been one avenue of funding support. As recently as 2013 a restoration Decision was signed to conduct road closure and decommissioning, using in-part funds from a settlement agreement with Portland General Electric (PGE) as part of their hydroelectric license. Stewardship contracts have also become an important funding source for conducting the work directed by the Increment Decisions. The recent Grove Thinning EA will become a stewardship contract that includes decommissioning that was directed by Increment 2.

Today there are about 2,850 road miles, of which 86 percent remain open to the public. More than 810 miles of road have been decommissioned from the Forest's road system since the early 1990s. A large proportion of those miles were decommissioned to diminish the impacts of high risk road segments to aquatic and water resources. The ATM and RA indicates that nearly another 160 miles are scheduled to be decommissioned, and another 612 miles are scheduled to be closed to motorized use but retained for future needs. Once again, many of these miles were prioritized because they posed a moderate or high risk to aquatic and water resources. A little more than 63 miles of road have been converted to trails, some for OHV users. Areas on the MTH designated for OHV use were defined during the development of Subpart B of the Travel Management Rule, which was completed in 2010. There are about 145 miles of roads and trails designated for OHV use.

Between 1989 and 2003 the budget for annual road maintenance on the MTH declined about 60 percent. Over the last decade it has continued to decline steadily by 2 to 5 percent every year. Restoration dollars to fix, stormproof, or decommission roads has also been declining. Since 2010, restoration dollars to diminish environmental impacts from roads has fallen 90 percent. The road

system continues to age, and many of the drainage structures such as bridges and culverts are older than what they were designed for. Many are faulty or function poorly.

Recent trends show that appropriated funds that are distributed to the MTH provide only enough to maintain or make repairs to about 15 percent of the road system annually. This can constrain and challenge how the priorities of annual maintenance funds are rotated around the transportation network. There are however, other dollars that can become available during any given year to help supplement additional need. These include monies generated by the sale of timber, legacy road funding, retained receipts from stewardship contracts, Emergency Relief for Federally Owned Roads, road use permits, and potentially Secure Rural School funds.

The population in the Portland metro area, Hood River, and some of the other neighboring communities, along with visitor use, has increased exponentially over the last two decades and is projected to continue. There are more types of users than ever before, and many people want to access the MTH for many different reasons. How will we be able to afford to maintain and upgrade the road system for the future when budgets are declining, yet the user base of the Forest is expected to rapidly increase as the nearby urban population expands over the next decade?

On November 9, 2005, the Forest Service regulations at 36 CFR part 212 governing administration of the forest transportation system and regulations at 36 CFR part 295 governing use of motor vehicles off National Forest System (NFS) roads were combined and clarified in the final rule as part 212, Travel Management, covering the use of motor vehicles on NFS lands. Subpart A remained essentially unchanged from the January 12, 2001 rule. The rule revised regulations concerning the management, use, and maintenance of the National Forest Transportation System. The goal of the rule was to ensure that additions to the national forest system road network were essential for resource management and use; that construction, reconstruction, and maintenance of roads minimized adverse environmental impacts; and that unneeded roads were decommissioned and restoration of ecological processes initiated.

The Chief of the Forest Service reaffirmed the agency's commitment in 2012 to completing Subpart A of the travel management rule, and directed that a science-based Travel Analysis Process (TAP), a key first step towards completion of Subpart A requirements be completed by the end of 2015. To complete the TAP individual units have been encouraged to build upon road-related analyses they have completed in the past, particularly the Roads Analysis (RA) of the early 2000s and Access and Travel Management (ATM) of the 1990s. For units that have conducted both previously, Forests were to assess the degree to which they adequately comply with Subpart A and fulfill its requirements. This initial step helped to determine the appropriate scope and scale of the new TAP so that it could be used to build upon previous work and minimize redundancy.

Given the current trend of the user base on the MTH, and all of the work of the past, this TAP is timely. The ATM of 1999, the RA of 2003, and the Legacy Roads Increment Strategy of 2010 serve as the foundation and starting point of the TAP for the MTH. It is considered to be another iteration of road assessment for the Forest, one that is additive to the last two decades of previous work. The Forest intends it to become more about defining a road system for the future. A future road system on the MTH should be one that balances the goals of providing for the access needs of our benefactors, provides them with options, continues to diminish unwanted environmental effects, and lessens the cost of our transportation network.

In 2013, the Mt. Hood National Forest (MTH) initiated the science-based Travel Analysis Process, which is the first step in completing Subpart A of the Forest Service (FS) Travel Management Rule, requiring each unit of the NFS to identify the minimum road system needed for safe and efficient travel and for the protection, management, and use of NFS lands (36 CFR 212.5(b)(1)); and identify roads

that are no longer needed to meet forest resource management objectives and that, therefore, should be decommissioned or considered for other uses (36 CFR 212.5(b)(2)). The Travel Analysis Process is described in Forest Service Manual 7712 and Forest Service Handbook (FSH) 7709.55, Chapter 20. This process includes the following 6-steps: 1) setting up the analysis; 2) describing the situation; 3) identifying issues; 4) assessing benefits, problems, and risks; 5) describing opportunities and setting priorities; and 6) reporting. Travel Analysis considers access needs, environmental risks, and financial considerations.

Scope of the Analysis

There are multiple scales at which travel analysis may be conducted to inform road management decisions. Generally, road management decisions should be informed by travel analysis at a broad scale such as the Forest or Province level. The Mount Hood Forest Supervisor determined that this travel analysis would be at the Forest-level. Guidance on selecting the appropriate scale and those proposed actions which may trigger a need for a roads analysis is set forth in Forest Service Manual 7712 and Forest Service Handbook 7709.55, Chapter 20.

Objectives of the Analysis

- To build upon the 1999 Access and Travel Management Plan, the 2003 Roads Analysis, and the 2010 Legacy Roads Increment Strategies by wrapping them into the Travel Analysis Process and incorporating them by reference.
- To display the Objective Maintenance Levels from the 1999 ATM, and the Access and Resource risk ratings from the 2003 RA (Appendix 8).
- To identify the roads that are likely needed for the future, and those that are not (Appendix 1).
- Identify roads that have been covered by a NEPA analysis for closure (Maintenance Level 1) or decommissioning (Appendix 8). These roads have not yet been closed or decommissioned due to timing considerations, but are scheduled to be closed or decommissioned in the future as opportunities and funding arise.
- To identify the Forest's roads that have been covered by a NEPA analysis and that are to remain open and have not been planned to close or decommission (Appendix 8).
- To identify roads that had not been covered by a NEPA analysis (Appendix 8)
- To evaluate the various sources and levels of past road maintenance funding.
- To ensure that the Forest transportation system provides sustainable access to national forest resources over the short and long term.
- To provide a list of opportunities and analysis background necessary for the identification of the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System (NFS) lands, per 36 CFR 212. 5(b)(1).
- To provide a list of opportunities and analysis background necessary for the identification of the roads on lands under Forest Service jurisdiction that are no longer needed to meet forest resource management objectives and therefore should be decommissioned or considered for other uses, per 36 CFR 212. 5(b)(2).

- To provide recommendations for the District to use to implement road-related projects and system updates.

What this Analysis Does NOT Do

- This analysis will not make site-specific decisions about which roads will be retained or closed. Those decisions are made at the project scale with public input on site-specific situations.
- This analysis is not a decision document. Opportunities and findings will only be used to inform decisions at higher or lower scales. They are not standards or guidelines under the Mount Hood Land and Resource Management Plan. Opportunities and findings are subject to change as new or better information becomes available.
- This TAP does not reverse or overturn any other previous decision relative to road closures or decommissioning.
- This analysis does not address off-highway vehicle (OHV) use on the Forest. That 2010 decision, which was amendment #17 to the Mount Hood Land and Resource Management Plan, was completed as part of Subpart B of the Travel Management Rule. From it came the Motorized Use Vehicle Map that designates which roads, trails, and areas OHVs can use on the MTH. It also identified the roads that are planned to be converted into OHV trails.
- Travel over snow is not addressed in this analysis. That would be addressed under Subpart C of the Travel Management Rule, which is initially scheduled to begin in 2016.

The Analysis Process

On the Mount Hood National Forest the Travel Analysis Process relied on past work that was completed over the previous two decades. Much of that work specifically addressed roads and represents multiple iterations of assessing the transportation system in terms of Access needs and Resource risks. Our aim was to capitalize on the valuable work that had been done prior, so that redundant work was minimized and we didn't try to re-invent the wheel. A lot of institutional knowledge was compounded through those previous iterations, so capturing its additive value was an objective.

Setting up the Analysis:

To proceed with the analysis a variety of data sets had to be compiled and undergo QA/QC. It was verified that the necessary attribute data from the 1999 ATM was entered into the agency-wide corporate database that house the information for our road infrastructure (i.e., INFRA). One attribute paramount to our TAP effort was the Objective Maintenance level, which designates the desired future condition of a road based upon the results of the watershed analyses that fed into the ATM process. Next, because there have been so many prior Decisions that included road-related restoration over the last twenty years, it was important to check and see if those updates had been entered into the INFRA dataset. It was verified that all the Decisions up to 2013 had been incorporated into the database including the Legacy Road Increment Strategy, which in some cases would have revised the Objective Maintenance level and the route status assigned in INFRA. Lastly, in order to make the 2003 RA data useful, it needed to be married up with the current INFRA dataset and line segmentation so that it could be used spatially in a GIS environment.

The last effort revealed that the 2003 road data was segmented several degrees of magnitude greater than that of the INFRA data. This necessitated that an exercise be undertaken to make common the 2003 segments with those in INFRA. This meant that the original scoring and ranking of the 2003 process had to somehow be applied to the INFRA road segments, which were far fewer. The problem was that a road in the 2003 RA may have been segmented multiple times and been assigned a range of different scores, but that same road in INFRA may be only a single segment. How then can multiple scores be applied to a single segment? A weighted average methodology was applied so that the INFRA segment had its own unique value based upon the 2003 scores. This resulted in some of the roads ranked a little differently than those in the 2003 RA because the scores assigned to multiple segments of a road were averaged into a single value. But after review of the results it was concluded that the differences were slight and would have little bearing relative to the final outcomes. Marrying the 2003 RA ranking to the INFRA segments still resulted in a useful means for comparing multiple access needs with multiple resource risks.

After all of the data was compiled, an end-user had the ability to quickly sort or filter certain user-defined criteria. For example spatial analyses could be conducted to look at a road's actual status in INFRA, it's desired future condition as defined by the 1999 ATM, and compare them to the access needs and resource risks that were determined by the 2003 RA. These datasets afforded the capability to explore different outcomes using a variety of the conjoined attributes. The entire breadth of the last two decades of assessment, from watershed analysis, to road assessments, to past and recent Decisions has been incorporated into the TAP as a result of the QA/QC process, and can be considered to be the first approximation of the road system of the future for the MTH.

It was recognized that although a breadth of previous work has been incorporated into the TAP, there could be other influences that would change the outcome of a road's future. Three general influences include: conditions that have changed since the 2003 RA, public and stakeholder involvement for the TAP, and economic objectives. These influences could necessitate a modification or refinement of the desired future condition of a road, or its access needs and resource risks.

An analysis of changed conditions since 2003 was conducted with both the east and west zone teams of the MTH that were assigned to help with the TAP given their local knowledge of the road network. The Core team brainstormed a list of items that have changed since the 2003 RA (Figure 2). Then each of the zone teams were tasked with answering three general questions about their road network with consideration of each changed condition.

1. Has the access need increased or decreased for a certain road due to a changed condition?
2. Has the resource risk increased or decreased for a certain road due to a changed condition?
3. If the access need, or the resource risks have increased or decreased based upon a changed condition, does that necessitate revising the Objective Maintenance level of the road?

Figure 2 Changed Conditions to Consider since the 2003 RA

<ul style="list-style-type: none"> • New Wilderness • New Wild and Scenic Rivers • New National Recreation Area • 2010 Motor-Use Vehicle Map • 2008 Recreation Facility Analysis • New or Renewed Special Use Permits • Changes in maintenance responsibility (e.g., county, BPA, PGE, City of Portland) • New Wildland-Urban Interface • Strategic Fuels Plan (e.g. ingress/egress and fuel treatment needs) • New or updated Community Wildfire Protection Plans • Access to protect against wildfire escapement from designated wilderness 	<ul style="list-style-type: none"> • New NSO Critical Habitat Units • Forest health issues in NSO home ranges • Habitat for new ESA listed wildlife/plants • Updated road density in deer and elk winter range • New unique habitats • Latest Regional Forester's sensitive species list • Changes in Survey and Manage species • New aquatic TES species listings • Remedied fish passage barriers • Updated fish distribution • Roads adjacent to newly available TES fish habitat • Fish reintroductions • Changes to landslide hazard or surface erosion hazard • New high risk stream crossings 	<ul style="list-style-type: none"> • New Municipal water supplies • New or updated Water Quality Restoration Plans • New 303(d) listings • Updated Watershed Condition Framework • 2012 Terrestrial Condition Assessment Pilot • New or expanded populations of noxious weeds/TES plants • Increase in demand for special forest products • Increased road and mountain bike cycling • Tribal Forest Protection Act responsibilities • Land exchanges • Other changes identified by the Zone Teams (ex. Utilities)
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The next step was to gather information from our public and stakeholders. Several modes of comment were made available to solicit feedback. A form letter was sent out to all of the individuals, organizations, and agencies on our mailing list to inform them of the TAP and solicit their involvement. Four public meetings were scheduled at each of the Ranger Districts to reach out and offer face-to-face dialogue with residents, neighbors, local governments, NGOs, and other interested parties. We asked them to provide written comment by asking a series of questions. These same questions also solicited comment via our webpage.

1. What do you like to do when you visit the MTH?
2. Which roads are a priority for you or most important for accessing your favorite area or activity?
3. Are there particular roads that provide you unique opportunities?
4. If motor vehicle access were closed to a place you used to drive to, how would that affect your experience?
5. Is there anything else you'd like to share?

Answers to the questions along with input solicited from NGOs and special interest groups that were visited helped to identify issues to consider specific to the MTH, and to identify roads where an access

need or resource concern may have increased or decreased since the 2003 RA. This feedback along with the input from the Zone teams was used to generate a list of roads where the Objective Maintenance level established by the 1999 ATM may need to be revised. These revisions would then indicate the 2nd approximation of the future road system.

The last and 3rd approximation of the future road system was conducted by way of the economic analysis. A formulaic exercise prescribed by the Regional TAP Guidance (cite) was used to evaluate and appraise the maintenance costs to be expected. For the MTH several sideboards were determined for conducting this exercise.

1. What are the costs of maintaining the current road system?
2. What is the cost of maintaining the desired future condition of the road system as defined by the Objective Maintenance levels from the 1999 ATM, considering all of the roads that have been decommissioned to-date?
3. What is the cost of maintaining the desired future condition of the road system as defined by the Objective Maintenance levels from the 1999 ATM as adjusted by the changed conditions analysis and public/stakeholder feedback?
4. If the cost of maintaining the desired future road system as revised by changed conditions analysis and public/stakeholder input does not fall within $\pm 20\%$ of the previous 5-year average of appropriated funds, then how should costs be decreased?

If at this point the financial objectives of a future road system are not within the Regional tolerances, then Access and Resource ratings from the 2003 RA will be used to identify candidate roads for changing the Objective Maintenance level or decommissioning. Initial screening criteria would focus on those roads where Access ratings are low and resource risks are rated as high. These steps are designed to be sequential with the understanding that the process may require feedback and iteration among steps over time as the analysis evolves.

Note: Maps Appendix RA contains the maps of Access and Resource Risk Ratings from the 2003 RA.

Appendix 3 contains the Aquatic sub-factor risk ratings from the 2003 RA

Interdisciplinary Team Members and Contributors

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	Vegetation Program Mgr.	Sam Grimm
	District Ranger Lead	Jackie Groce
	Principle Staff/Natural Res.	Nancy Lankford
	NEPA Coordinator	Michelle Lombardo
	GIS	Jill Masters
CONSULTING TEAM	Botany	Chad Atwood
	Fire	Dirk Shupe
	Heritage	Allie Wenzl
	Wildlife	Alan Dyck
WEST ZONE	Botany	David Lebo
	Fire	Mike Moore
	Fisheries	Tom Horning
	Heritage	Debbie Ortiz
	Hydrology	Todd Parker
	Recreation	Aaron Pederson
	Special Products	Amber Sprinkle
	Timber/Silviculture	Jim Roden
	Wildlife	Ed Buursma

EAST ZONE	Botany	Christina Mead
	Engineering	Bob Ballard
	Fire	Leo Segovia
	Fisheries	Chris Rossel
	Heritage	Mike Dryden
	Hydrology	Mark Kreiter
	Range	Dan Fissell
	Recreation	Claire Pitner
	Special Products	Cheryl Sonnabend
	Soils	John Dodd
	Timber/Silviculture	Andy Tierney
	Wildlife	Stephanie Powers

2. Describing the Situation

The existing road system on the MTH reflects decades of past work that has been a continuum of effort to strive to achieve more balance between access priorities and needs, and minimizing environmental effects and long-term costs associated with retaining and managing a transportation network across the Forest. The effort is enduring, and will not end with this TAP. Future iterations of re-assessment will occur.

The Forest Service uses a data base and reporting system with GIS tools known as, “INFRA” that enables them to manage and store their current inventory of constructed features and facilities. INFRA is the digital warehouse where the inventory of Forest Service roads is stored. This information is continually being updated as decisions or projects are implemented, or as conditions on the ground change.

For the TAP on the MTH, we froze the data we used from INFRA in the winter of 2014, so as not to have to constantly make small updates and time consuming edits to our data and maps. Hence there are small differences in the data we used and that which gets updated in the INFRA database afterward. These differences have little bearing on the outcome of our TAP, particularly since the scope of our analysis is intended to be strategic and not too fine-scale or prescriptive.

Existing Road System

Like many National Forests in the Pacific Northwest, the existing transportation network (2,845 miles) on the MTH consists of a variety of road types to accommodate a variety of uses. Most (86%) of the road system is currently open to motorized vehicle use by the general public. There are also 146 miles of road converted to trails or that have been designated for use by off-highway vehicles in four specified areas of the Forest (OHV ROD, 2010).

As displayed in Table 1, the open road system currently consists of roads designed for passenger vehicles with low clearance, or roads that are better suited for vehicles that have high clearance. Some of these roads are primary routes that are used to access the Forest by the greater majority of visitors, while others are secondary routes providing access for a lesser degree of use. The greatest degree of use occurs on a proportionally small amount of the total miles of the road system.

Under current decisions, about 14 percent of the road miles are closed to motorized use, but are retained as part of our system for future periodic access needs. Another 26 percent have either been planned to be closed and retained, or their future access has yet to be decided.

Table 1 – Percent of the Road Miles by Access and Travel Management Type on the MTH.

Class and Clearance Type	Percent of Total Miles
Primary Low Clearance	7
Secondary Low Clearance	10
Secondary High Clearance	7
Other Open	39
All Other (closed, planned to close, or to be determined)	37

As displayed in **Table 2**, the majority of the road miles (54%) on the MTH consist of gravel or native surfaced roads that provide access to localized areas of the Forest. Segments of road with asphalt account for only about 18 percent of the total miles. Primary arterial routes make up the smallest amount of the road system.

Table 2 – Percent of the Existing Road Miles by Functional Type and Surface Type on the MTH.

Surface Type	Arterial	Collector	Local
Asphalt	10	7	1
Aggregate or Gravel	1	20	35
Bituminous Surface Treatment	1	2	1
Improved Native Material	0	<1	3
Native Material	0	3	15
Total	12	33	55

The degree of maintenance that is planned for each road has been designated by the 1999 ATM plan. It defined five maintenance level designations, and individual roads in the INFRA database are assigned one of those. Each category defines the level of service and maintenance intended for a specific road, and an indication of the design standards and level of use expected. The higher the number, the greater the standard of design, service, and maintenance needed to retain the road in the system. The five maintenance levels are summarized as:

Road Maintenance Level 5 – roads are managed and maintained for a high degree of user comfort. These roads are generally paved and are suitable for passenger vehicles.

Road Maintenance Level 4 – roads are managed and maintained for a moderate degree of user comfort. These roads are generally paved, but sometimes may be surfaced with stabilized aggregate surfacing and are suitable for passenger vehicles.

Road Maintenance Level 3 – roads are managed and maintained for a moderate degree of user comfort. These roads are generally gravel surfaced and are suitable for passenger vehicles.

Road Maintenance Level 2 – roads are managed and maintained for use by high-clearance vehicles; passenger car traffic is not a consideration.

Road Maintenance Level 1 – roads are kept on the transportation system for intermittent project uses and are closed to vehicular traffic between projects. The closure period must exceed 1 year for the road to be ML 1 status.

Table 3 provides a breakdown of the current road system by the Operational Maintenance Level. This defines where we are in terms of our existing maintenance and service operations. It identifies priorities that inform annual operations as well as longer term needs. The highest priority service and maintenance operations are designated for the portion of the road system that receives the greatest amount of use or that has been identified as being needed for critical ingress/egress, which

consists of a comparatively small proportion of the total road miles. The frequency of service and maintenance operations for the majority of the road miles on the MTH is low because they are small local roads. They were constructed to a standard of design intended for slow speed, high clearance, and minimal comfort. They were principally intended for managing forest resources and removing timber for lumber. Maintenance levels 3, 4, and 5 are principle routes that provide access to, from, and through the Forest. Many are important connecting routes to the most frequently used sites, as well as between local communities that neighbor the Forest.

Table 3 – Percent and Miles of Existing Road by Operational Maintenance Level on the MTH.*

Operational Maintenance Level	Miles	Percent of Total Miles
1 – Basic Custodial Care (Closed)	400	14
2 – High Clearance Vehicles	2,080	73
3 – Suitable For Passenger Vehicles	222	8
4 – Moderate Degree of User Comfort	88	3
5 – High Degree of User Comfort	55	2
Total	2,845	100

* Approximate values rounded to the nearest mile

To minimize environmental effects and provide a safe road for the public, some type of maintenance or reconstruction work occurs annually on about 15% of the Forest's road miles. The frequency of maintenance on any individual road segment is cyclic. Maintaining the road system however has increasingly become a challenge due to declining availability of funds. Between 1989 and 2003 the budget for annual road maintenance on the Mt Hood NF declined about 60%. Over the last decade it has continued to decline steadily by 2% to 5% every year (Figure 3), thereby decreasing the frequency of maintenance on many segments of roads, particularly those that are maintenance level 2.

Forest roads were primarily constructed to access lands for timber production and were paid for largely through timber sale receipts. Capital investment funds were used to construct roads into most facilities such as developed campgrounds. Road maintenance was funded largely by timber sales and congressional appropriations. Since 1990 however, timber harvest has declined from an average of 369 million board feet (MMBF) annually 25 years ago to approximately 30 MMBF today. This has drastically reduced the road maintenance that used to be accomplished by the timber purchasers and the deposits they made for road maintenance. Because of the reduced traffic from hauling timber to the mills, the associated maintenance needs have also diminished.

But maintenance is still needed. Weather and runoff still effect road features, and motorized visitor use has increased. The population in the metro area and surrounding communities along with visitor use has increased exponentially over the last two decades and the trend is projected to continue. Over 4 million people recreate on the Mt. Hood NF annually with more demand for recreation use. There are more types of users than ever before, and many people want to access the Mt Hood NF for many different reasons. Meanwhile, the road system continues to age, and many structures such as bridges and culverts are older than what they were designed for. Many are faulty or function poorly.

According to estimates from the Washington Office it would take approximately \$52 million dollars to bring the entire road system on the Mt. Hood back up to standard (like new condition), including all of the deferred maintenance and cyclical work to replace gravel surfacing, pavement overlays, bridges/structures, and major culverts on schedule. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and a decrease in asset value.

With funds being below what is necessary to keep the road system properly maintained, many roads do not get the treatments they need on schedule and have fallen into disrepair. Yet the Forest has continued to work towards reducing its transportation system incrementally as funding and project opportunities developed. Difficult administrative decisions have had to be made to reduce maintenance needs, usually by lowering the road maintenance level, transferring maintenance responsibility, converting roads to trails, and closing or decommissioning roads.

Much of the road-related work that was recommended by the 1999 ATM Plan and the 2003 Roads Analysis has been implemented over the last two decades, leading to a reduction in the miles of roads to maintain. Much of the work to reduce and minimize unwanted impacts to natural resources from roads also lowered some of the deferred maintenance burden. [Table 4](#) illustrates how the road system has changed from 2003 to 2015 on the individual Ranger Districts.

Table 4 – Percent Decrease in Road Miles by Ranger District on the MTH since 2003.

Ranger District	Percent Decrease of the District's Total Miles
Barlow RD	11
Clackamas RD	16
Hood River RD	7
Zigzag RD	22

The open road network has also changed since 2003. Changing the maintenance status of many roads to the objective maintenance level recommended by the 1999 ATM has decreased the frequency and cost of maintenance on many road segments. [Table 5](#) indicates how maintenance levels have changed since 2003. Many road miles that were once designated as maintenance levels (ML) 4 or 3 are now designated as ML 2. Hence, on many miles road maintenance has been less frequent, and there are now segments which used to be suitable for highway passenger vehicles that no longer are. On the other hand, there are a greater amount of miles that have been converted to ML 5. These are existing, high-use primary routes through the Forest and include those that connect communities, such as Forest Road (FR) 44 that links State Highway 35 with the town of Dufur. Segments of these roads were upgraded to a ML 5 as recommended by the 1999 ATM, or as a result of reconstruction activities that caused them to function at a higher level. Since 2003, the road network has changed to one that reflects somewhat better the reduction of log haul on secondary routes and thus less maintenance, and an increase in user access on primary routes necessitating a greater degree of maintenance. In short, maintenance has become prioritized to the Forest's primary routes.

Table 5 – Comparison of Miles of the Open Road Network in 2003 and Currently*

Maintenance Level	2003 Miles	2014 Miles
2 – High Clearance Vehicles	1,150	2,080
3 – Suitable For Passenger Vehicles	462	222
4 – Moderate Degree of User Comfort	171	88
5 – High Degree of User Comfort	12	55

The MTH is responsible for maintenance across the majority of our road system (Table 6). There are other entities however, that are responsible for maintaining certain other roads. Agreements for road operation and maintenance are in place for about 8 percent of the road system. Due to the reduced haul traffic and associated maintenance that was performed by timber haulers, the share of maintenance for other commercial users has increased. Agreements are in place to authorize maintenance of certain portions of the MTH road system by other parties.

The Forest Service is authorized to recover costs of road reconstruction and maintenance from commercial users commensurate with their use (FSM7703.5). Commercial operators who use Forest Service road are required to perform their commensurate share of maintenance. For example, the City of Portland Water Bureau is responsible for road maintenance in the Bull Run municipal watershed. Portland General Electric and the Bonneville Power Administration are also responsible for maintaining certain roads. These cooperative agreements help reduce some of the financial burden for maintaining the road system.

Table 6 – Percent of System Road Miles by Primary Maintenance Responsibility

Primary Maintainer	Percent of Total Miles
BLM	<1
County, Parish, or Borough	<1
Cooperator	1
Commercial User	<1
Forest Service	92
Municipality	7
Other Federal Agency	<1
Private	<1

Average annual cost of routine road maintenance is defined as the average yearly need for basic road maintenance. This includes log out, drainage maintenance, erosion control, blading, brushing, traffic signs, etc. It does not include cyclical replacement costs (such as bridge replacement every 50 years, asphalt overlays, etc.), which are covered by funding from the Regional Capital Investment Program and are not considered annual maintenance needs. **Table 7** displays average costs by maintenance level and type of road surface. Roads that are the primary routes through the Forest that receive the greatest amount of use are the most costly to maintain to standard. Roads that are closed but retained for future use and put into “storage” are the least costly to maintain.

Table 7 – Average Annualized Routine Maintenance Costs.

Maintenance Level	Surface Type	Geographic Zone	Cost Per Mile
5 – High Degree of User Comfort	Asphalt	West Zone	\$5,155
		East Zone	\$4,867
4 – Moderate Degree of User Comfort	Asphalt	West Zone	\$4,433
		East Zone	\$3,447
3 – Suitable For Passenger Vehicles	Aggregate	West Zone	\$2,113
		East Zone	\$1,301
2 – High Clearance Vehicles	Aggregate	West Zone	\$685
		East Zone	\$404
		Gentle relief, no streams	\$75
1 – Basic Custodial Care (Closed)	Native/Aggregate	West Zone	\$45
		East Zone	\$2

Table 8 shows the miles of road decommissioning that has occurred on the Forest over the last 25 years. Since 1994 watershed restoration has been a focus on the MTH, and a part of regularly scheduled operations in the annual program of work. Much of the road decommissioning work was aimed at reducing the effects from the road system to aquatic and water resources. Many segments of road that were identified as being a high risk to aquatic, water, and wildlife resources have been decommissioned.

But funding that was available over the last two decades to fix, stormproof, close, or decommission roads has also been in decline. Since 2010, restoration dollars to diminish environmental impacts from roads has fallen 90 percent on the MTH. This in part has been due to a reduction nationwide in appropriated funds dedicated to that purpose. But it is also because the MTH has been downsizing its road system for over two decades, so available monies are now being shifted to priorities elsewhere on other Forests in the Pacific Northwest Region.

Table 8 – Miles of System Road that Have Been Decommissioned on the MTH Since 1990.*

Status	Miles
Miles Decommissioned Prior to 2003	356
Miles Decommissioned Since 2003	457
Miles left that are Designated to be Decommissioned	159
Total	972

* Approximate values rounded to the nearest mile

Closing and decommissioning roads have an initial transition cost. While closed roads have an annualized cost, decommissioned roads do not. The transition cost to decommission a road and remove it from the system depends upon the method. There are active methods to decommission or close a road, and there are natural or passive methods. Some roads have become so grown over they are no longer passable, and have not been used in many years. Some of those remain closed but are considered to be in storage for later use, while others have been removed from the system and are considered to have become naturally, or passively decommissioned. Natural closure or decommissioning is considered to be without a transition cost. Transition costs associated with storing or decommissioning roads are listed in [Table 9](#). Re-opening a road to use again also comes at a cost.

Table 9 – Maintenance Level Transition Costs to Store, Re-open, or Decommission a Road.

Method	West Zone	East Zone
Active Storage no storm proofing	\$3,000/mile	\$3,000/mile
Active Storage w/storm proofing	\$3,000/mile, plus \$1,950 per live stream pipe	\$3,000/mile, plus \$1,950 per live stream pipe
Re-open a closed road	\$5,085 per mile	\$4,390 per mile
Active Decommission	\$11,000/mile, plus \$1,950 per live stream pipe	\$11,000/mile, plus \$1,950 per live stream pipe

Roads that have been decommissioned or closed have been chosen because of a number of resource issues, and focused on certain priorities. Many miles of our road system for example have been closed or decommissioned in municipal watersheds. In particular the Bull Run, the source of water for the City of Portland where over 130 miles were decommissioned. Similarly, many roads have been closed in the municipal watershed for the City of the Dalles. A flood in 1996 damaged so badly roads in the Fish Creek drainage (an anadromous tributary to the Clackamas River) that the Decision was made to decommission 100 miles of its network. Throughout Watershed

Analysis of the last half of the 1990s and into the Legacy Roads increment planning, road closure and decommissioning focused heavily on reducing effects to ESA listed streams. Those efforts also included the removal of nearly all of the passage barriers to anadromous fish on the Forest. Focus of some of the more recent treatments have been in watersheds designated as Key by the Northwest Forest Plan (1994), and High Priority by the Watershed Condition Framework (2012). There have also been many closures and decommissioned roads in deer and elk winter range, and in Late-Successional and Riparian Reserves. In many cases, the decisions to close or decommission a road have been difficult, and resulted in challenging tradeoffs.

Closing or decommissioning roads has also been conducted to address illegal or unauthorized uses of roads. On the MTH the main contributors have been:

- Dumping trash
- Illicit drug production or growing
- Road damage or blockade by protesters
- Access to unauthorized off-highway vehicle use
- Unauthorized and destructive target shooting
- Poaching wildlife

Over the past 20 years, the MTH has been committed to terrestrial and aquatic restoration while considering the role, importance, and interdependency of all resources, including people. In 2013 the Forest designated roads, trails and areas that are open to motorized travel. The Forest's operating budget continues to decline impacting its ability to maintain an extensive road system. Therefore, non-arterial roads will be scrutinized as potential candidates for closure until future access is needed (Maintenance Level 1) and roads that are determined to no longer be needed for resource management or public access purposes may be removed from the system (decommissioned). Opportunities for both road closure and decommissioning treatments will be prioritized based on those posing the highest risk for environmental damage.

3. Issues

Road-related issues have been a principal factor in many prior analyses, plans, and decisions on the MTH. Like many national forests those issues have often been reiterated on this Forest. At the core of them are social, environmental, and economic concerns. These are parallel to, and echo the principle goals of the Travel Analysis Process: Recommending a road system for the future that provides needed access, minimizes environmental effects, and is less costly. These have been stratified further into more specific issues in the 1999 ATM and 2003 RA and are addressed again and again in subsequent environmental analyses and official Decisions related to aquatic, wildlife, and watershed restoration. Some of the road issues are best addressed at the watershed or project scale rather than the landscape-scale but in summary, eight issues were found to be important for informing road decisions on the MTH:

Economics – Declining maintenance budgets affect our ability to maintain the extent of our current road network.

Access Needs – People depend on Forest roads for safe travel and access. Use on the Forest continues to increase, particularly for recreation, traditional use, consumer demand, and forest protection.

Recreation – The Forest has an abundance of year-round recreation opportunities for local residents and visitors from around the world for whom road access is fundamental to their pursuit.

Heritage Resources – The Forest has historic properties such as Timberline Lodge with celebrated significance, and is traditional land for locally indigenous tribal communities.

Vegetation Management – Road access is essential for restoring desired forest characteristics and providing for consumer demands.

Wildfires and Fire Suppression – Roads influence both wildfire occurrence and suppression strategies.

Natural Resource Risks – Roads can pose risks and adverse impacts to valuable natural resources. Minimizing unwanted effects of roads is a restoration goal.

Aquatics and Water Quality – Roads can influence hydrologic function, stream dynamics, and water quality.

Fisheries – Roads can affect fish habitat and fish passage.

Terrestrial Wildlife – Roads can affect wildlife through habitat fragmentation and disturbance.

Noxious Weeds – Roads and people can increase the spread of noxious weeds.

Each issue has a discussion of the current situation, risks and benefits, and desired future conditions. Recommendations concerning all issues are summarized in Chapter 4.

Economics

Declining maintenance budgets affect our ability to maintain the extent of our current road network.

Current Situation

Forest Service road budgets have been steadily declining for the past 20 plus years. Region-wide, the amount of funding for road work including both appropriated funding and work contributed by commercial users is less than 20 percent of what it was 20 years ago. Appropriated road funds to the Pacific Northwest Region (Region 6) have been reduced 40% in the past 5 years alone. Current levels of funding for road work on the MTH are shown in [Table 10](#).

Table 10 – Five Year Average Road Funding on the MTH in Millions of Dollars.

Funding Source	Forest Operational Budget					5 Year Average	Percent to Maintenance	Average Mtc. Budget
	2010	2011	2012	2013	2014			
CMRD	1,195	1,029	854	772	863	943	38	\$358
CMLG	35	35	35	35	35	1,005	100	\$35
CWF2	214	215	249	200	500	276	100	\$276
Other FS - SSCC	0	0	0	0	75	15	100	\$15
Purchaser Mtc.	591	225	568	480	393	451	100	\$451
RUP Other non-FS	5	19	19	18	5	13	100	\$13
Total =								1,138

With funds being far below what is necessary to keep the road system properly maintained, many roads do not get the maintenance treatments they need on schedule and are falling into a severe state of disrepair.

Deferred Maintenance is defined as “maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value”, (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998).

Annual Maintenance is defined as “work performed to maintain serviceability, or repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur”, (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998).

Since 1999, the Forest Service has been tracking the amount of the deferred maintenance backlog. **Figure 3** shows what the accumulated totals are for deferred maintenance (DM) and the annual maintenance (AM) needs that would be required to keep the road system fully maintained to standard.

For the MTH, it would take approximately \$52 million to bring their entire road system back up to standard, and about \$4.9 million per year to keep it that way. Please note that the unit costs used to arrive at the figures above are made up of national averages to restore and maintain the road system in a like new condition. They also include the cyclical items necessary to replace gravel surfacing, pavement overlays, bridges/structures, and major culverts on schedule.

Using Regional unit costs, without the national burden rate, the current estimate for annual maintenance needs to keep the existing MTH road system fully maintained to standard would be about \$2.9 million dollars per year. **Table 10** shows that, on average, the Mt. Hood National Forest only receives about \$1.1 million dollars per year, (including maintenance performed by commercial users), that can be applied toward road maintenance work. This is about 39% of the funding necessary to address the estimated annual maintenance needs to fully maintain the road system.

Based on these figures, if the Mt. Hood National Forest were to focus their currently available funds on a given set of roads to fully maintain to standard, they would only be able to maintain approximately 130 miles of roads if they were paved (at ML5), or about 230 miles of roads if they were gravel surfaced (at ML3), or about 500 miles of roads if they were only native surfaced (at ML3). That size of road system would not meet the needs of the forest or the public, and would not allow forests to meet resource management objectives in their Forest Plans or to meet statutory and regulatory requirements as described in the 2005 Travel Management Rule.

Potential risks associated with reduced or limited road maintenance are decreased user safety and increased resource damage. Smaller routine maintenance budgets result in less road brushing, surface maintenance and signing, which decrease visibility, driving comfort and directional information. Less ditch line and culvert cleaning increases the likelihood of water damage to road surfaces and increased sedimentation into aquatic systems. Deferred maintenance on road segments that have deteriorated over time contributes to unsafe use of the roads and potential for catastrophic damage resulting from storm events.

The benefit of prioritizing limited maintenance funding is that available funds can be used on the areas of highest public road use and locations that have a higher risk of road system and environmental damage. Documenting maintenance shortfalls and inventorying long-term needs helps prioritize projects where needs exceed funding sources.

Scenarios

Given the enormous gap between available funding for road work and the cost to maintain the road system fully to standard, the MTH recognized that it would not be possible to balance the size of the road system with the cost of maintaining all roads fully to standard and still be able to meet resource management needs or the needs of the public. Since the requirement to “reflect long-term funding expectations” was not defined in regulation or policy, Region 6 defined it in the R6 Guidance for Preparing a Travel Analysis Report document to mean that “average annual funding” is reasonably in balance with the “average annual cost of routine road maintenance”, where:

Average annual funding is defined as the average amount of funding available for each NFS unit for routine annual maintenance from appropriations, collection accounts, commercial users, cooperators, and other partners during the 2010-2014 timeframe, plus or minus 20% (Table 11). It does not include funding from the American Recovery and Reinvestment Act (ARRA) or the Capital Improvement Program (CIP). Only the modest amounts specified for “routine maintenance” in Legacy Roads and Trails funding allocations are included.

Average annual cost of routine road maintenance is defined as the average yearly need for basic road maintenance. This includes log out, drainage maintenance, erosion control, blading, brushing, traffic signs, etc. It does not include cyclical replacement costs (such as bridge replacement every 50 years, asphalt overlays, etc.), which are covered by funding beyond the individual NFS unit budgets (e.g., Regional Capital Investment Program).

Table 11 – Five Year Average Road Budget Plus or Minus 20 Percent on the MTH (Millions of Dollars).

5-YR Average Maintenance Budget	Range	
	-20%	+20%
\$1,138	\$911	\$1,366

The Mt. Hood National Forest utilized the Region 6 Financial Analysis Template, which is based on the definitions above, to perform the financial analysis. This template is an excel spreadsheet workbook that allows users to input budget information and calculate unit costs for a variety of road maintenance work activities for different maintenance intensities on different standards of road. This allows the user to compare the cost of maintaining the current system of roads with a variety of scenarios for different potential future road systems. The user is able to alter the overall size of the road system, the composition of different maintenance standards, and the intensity or frequency of maintenance work on different types of roads.

Financial Analysis Steps:

1. Estimate 5 year average funding available for road maintenance work
2. Identify local Unit Rates used for routine annual road maintenance work
3. Use work item unit rates to build unit rates for different road standards and maintenance intensities
4. Calculate cost to maintain current road system at current maintenance intensity
5. Develop different scenarios for future road systems that show what size and composition of road networks can be maintained within range of average annual funds.

Many combinations of road networks are possible that fall within the range of expected future road maintenance funds. The purpose of the following discussion is to show a range of these possible scenarios and discuss changes to the road system that would be necessary to achieve them.

Objective Maintenance Level – Scenario 1

The current scenario would be to maintain the existing level of roads maintained for passenger car use on the forest. The purpose would be to provide similar road conditions for forest visitors who travel in low-clearance passenger cars to visit developed recreation sites as currently exists. To achieve this, the operational maintenance level 3-5 roads would continue to be maintained similarly to current conditions, but fewer roads would be able to be maintained for high clearance vehicle use in order to reduce costs. Thus some high clearance roads would be left un-maintained and eventually closed. Site specific planning decisions that were made in the past would be implemented to reduce the overall mile of system road. Comparison of the current scenario (operational ML) and the 1999 ATM proposed scenario (objective ML) are summarized in **Tables 12, 13 and Figure 2.**

In the scenario proposed by the 1999 ATM's objective maintenance level, the amount of roads maintained for passenger car traffic would remain the same and the amount of roads maintained for high clearance vehicles would be reduced by 767 miles. There would be 614 miles fewer open roads available for public and administrative uses. The overall road system, (open and closed) would be 153 miles smaller than existing. These are the roads that were identified in the Travel Analysis Report as being "not likely needed for future use", (i.e., these are the roads that have existing NEPA decisions or will be evaluated in future NEPA documents to determine if they should remain on the transportation system or if they should be decommissioned or converted to other uses). This scenario would result in a cost savings of approximately \$410 thousand dollars per year over existing.

Table 12 – Proposed Changes to the Road System by Scenario 1.

Category	Road Miles		
	Current	After	Diff.
Overall size of transportation system (open and closed roads)	2845	2692	-153
Overall Open Road System (ML 2-5)	2445	1678	-767
Roads Maintained for Passenger Cars (ML 3-5)	365	365	0
Roads Maintained for High Clearance Vehicles only (ML2)	2080	1313	-767
Closed Intermittent Service Project Roads (ML1)	400	1014	+614

Figure 3 – Existing vs Scenario 1 Distribution of Maintenance Levels. [change pie slices from color to B&W patterns for copying ease]

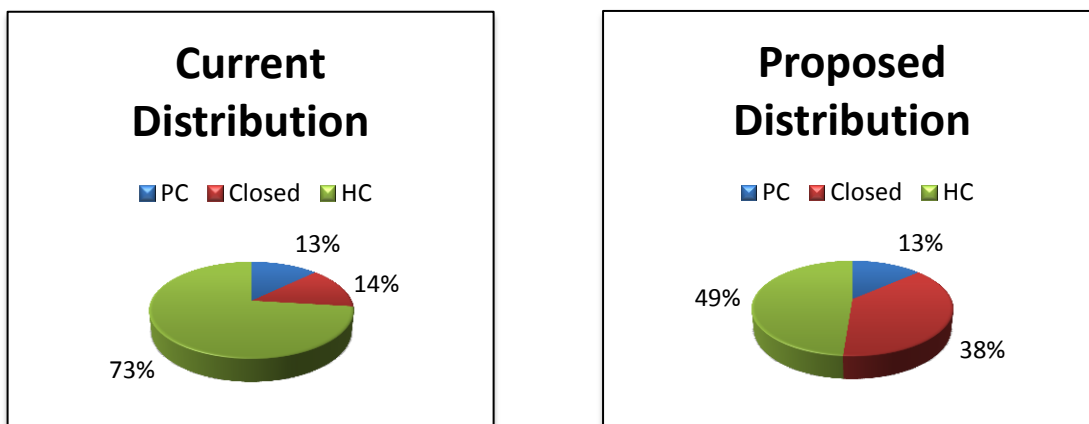


Table 13 – Comparison of Existing vs Scenario 1 Maintenance Levels.

OPML	Current (Operational)			Proposed (Objective ML)		
	Miles	% of sys	Cost	Miles	% of sys	Cost
5	55	2%	\$279,243	53	2%	\$269,089
4	88	3%	\$357,749	97	4%	\$394,337
3	222	8%	\$449,325	215	8%	\$435,157
2	2,080	73%	\$888,427	1,313	49%	\$452,891
1	400	14%	\$8,576	1,014	38%	\$21,740
	2,845	100%	\$1,983,320	2,692	100%	\$1,573,214

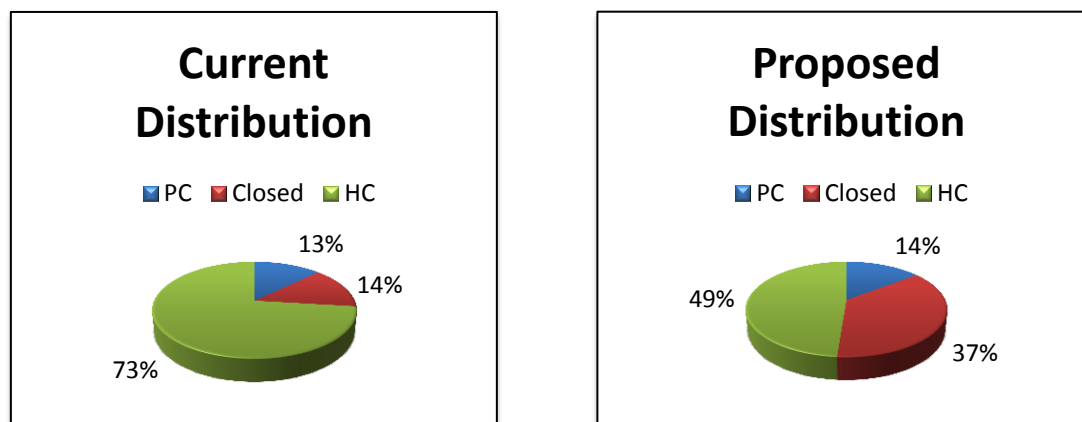
Modified Objective Maintenance Level – Scenario 2 (Increase passenger car miles)

This scenario would increase the existing level of roads maintained for passenger car use on the forest. The purpose of doing this is to provide similar road conditions for forest visitors who travel in low-clearance passenger cars to visit developed recreation sites as currently exists. To achieve this, the operational maintenance level 3-5 roads would continue to be maintained similarly to current conditions, but fewer roads would be able to be maintained for high clearance vehicle use in order to reduce costs. Thus some high clearance roads would be left un-maintained and eventually closed. Roads that have higher aquatic risk ratings and low access need ratings would be targeted for closure or decommissioning. The results of this scenario are summarized in Tables 14 and 15, and Figure 3.

Table 14 – Proposed Changes to the Road System by Scenario 2.

Category	Road Miles		
	Current	After	Diff.
Overall size of transportation system (open and closed roads)	2845	2644	-201
Overall Open Road System (ML 2-5)	2445	1678	-771
Roads Maintained for Passenger Cars (ML 3-5)	365	385	+20
Roads Maintained for High Clearance Vehicles only (ML2)	2080	1289	-791
Closed Intermittent Service Project Roads (ML1)	400	970	+570

Figure 4 – Existing vs Proposed Distribution of Maintenance Levels in Scenario 2. [change pie slices from color to B&W patterns for copying ease]



In this scenario, the amount of roads maintained for passenger car traffic would increase by 20 miles and the amount of roads maintained for high clearance vehicles would be reduced by 791 miles. There would be 771 miles less open roads available for public and administrative uses. The overall road system, (open and closed) would be 201 miles smaller than existing. This scenario would result in a cost savings of approximately \$380 thousand dollars per year over existing.

Table 15 – Comparison of Existing vs Scenario 2.

OPML	Current (Operational)			Proposed (Objective ML)		
	Miles	% of sys	Cost	Miles	% of sys	Cost
5	55	2%	\$279,243	53	2%	\$269,089
4	88	3%	\$357,749	97	4%	\$394,337
3	222	8%	\$449,325	235	9%	\$474,908
2	2,080	73%	\$888,427	1,289	49%	\$444,761
1	400	14%	\$8,576	970	37%	\$20,787
	2,845	100%	\$1,983,320	2,644	100%	\$1,603,881

Neither of these scenarios alone will fall within plus or minus 20 percent of the 5-year average annual maintenance budget. To get there, additional strategies to reduce the annual maintenance budget further would be needed. Two strategies options could be considered. Either, generate more money to cover the difference, or decreasing maintenance needs even more by shifting more roads to lower MLs, closing more roads, and still decommissioning more too. A combination of the two strategies could provide a more balanced approach.

Capital Investments

The scenarios consider only road maintenance needs and costs, but there are also costs associated with any proposed road decommissioning, road closures, and road improvements necessary to address risks and environmental concerns that have been identified. These costs are not included in the balancing of road maintenance funds because funding for these activities is not appropriated along with the normal road maintenance funds. Funding for this type of work generally comes through other programs such as capital investment programs, Legacy Roads and Trails funding, Federal Highway programs, partnerships with outside groups and agencies, etc. The need for these types of funds is high. Table 16 displays the average costs on the MTH for this work.

Table 16 – Comparison of Transitioning from the Existing System to Scenario 2.

Category	Miles	Cost / Mile	Total Cost
Estimated Cost to put roads in storage	614	3,000	\$ 1,842,000
Estimated Cost to decommission roads	153	11,000	\$ 1,683,000
Estimated Cost for improvement work	385	20,000	\$ 7,700,000
			\$24,481,000

As an example, the cost to prepare 614 miles of road for storage as ML 1 in Scenario 1 is estimated to be around \$1.8 million dollars. The cost to decommission 153 miles of road in that same scenario would be about \$1.7 million and the cost to perform a variety of road improvement work to mitigate resource-related concerns as identified in the 2003 RA would cost somewhere in the neighborhood of \$7.7 million.

This example illustrates that in Scenario 2, the opportunities identified in the 2003 RA line up well with the R6 guidelines for identifying a future system of roads where “average annual funding” is reasonably in balance with the “average annual cost of routine road maintenance”.

This balance addresses routine annual maintenance work needed to keep roads open and safe for use, and addresses critical resource concerns such as maintaining ditches and culverts for proper drainage. This work is accomplished by both the Forest Service, using appropriated road funds, and through commercial users who are required to maintain roads commensurate with their project uses.

Given the current trend in reduced funding for road maintenance work, and the enormous gap between current funding and need, it does not appear possible to identify a future road system where the entire cost of annual maintenance work necessary to fully maintain the roads to standard would be in balance with available funding, (i.e., to include annual maintenance items and cyclic capital costs for replacement of gravel surfacing, pavements, structures, bridges, etc.). In the Pacific Northwest Region, the size of road system to meet that requirement would be less than 200 miles per National Forest and would not allow forests to meet resource management objectives in their Forest Plans or to meet statutory and regulatory requirements. Because we will not have enough funding available to keep all road surfacing materials and structures replaced on schedule, we can expect the deferred maintenance backlog to continue to grow, and we will continue to see a decline in the overall serviceability of our road system.

However, even though we can’t alter the road system so much as to be fully affordable and sustainable within today’s budget levels, we can certainly take steps to move it in a better direction. By utilizing the opportunities and recommendations identified in the TAP, we can move toward a road system that is more affordable and sustainable.

Desired Future Condition

- A minimum Forest transportation system that safely and efficiently serves current and anticipated management objectives and public uses.
- A balance of routine and deferred maintenance funding maintains this system, which meets public uses and resource protection objectives.
- Available funding is primarily allocated to the ML 4-5 roads. Roads that are ML 2 and 3 primarily are maintained by project-associated funds commensurate with project use.

Access Needs

People depend on Forest roads for safe travel and Forest access, and use on the Forest continues to increase, particularly for recreation, traditional use, consumer demand, and forest protection.

The current Forest road system provides access to public lands but funding has not kept pace with maintenance needs. Local communities and businesses may depend on Forest roads as alternate access routes between rural communities and emergency evacuation. People and communities who depend on Forest roads will be affected as access to many areas of the Forest has become limited. Creative ways to reduce costs and maintain roads need to be developed.

Community impacts in relation to declining maintenance funding and reduced open road access were addressed in the 1999 ATM and 2003 RA for the MTH. The analyses identified roads with high access needs for a variety of uses including those vital to communities and long-term management of the Forest.

Nearly one-third of the Forest acreage is designated wilderness, where there are not any system roads or motorized use. The Bull Run Municipal watershed, which is mostly Forest Service land, is closed to the

public. The Dalles municipal watershed is closed to motorized use by the general public. Combined they comprise about 33percent of the Forest not available for motorized use by the general public.

Current Situation

The 2003 Roads Analysis (RA) underwent a re-evaluation of the access needs and priorities on the MTH. A scoring and ranking methodology was used to rate the relative need for individual roads to provide access for an array of uses.

Driving for pleasure is the most common motorized activity on the Forest. This includes driving to campgrounds, fishing streams, hunting camps, ski areas, target shooting sites, trailheads and many other recreational facilities. It is clear that road access to the Forest is key to the recreation experience. Like all National Forests, the list of recreational activities is long, and on the MTH entails year around pursuits. Winter recreation is just as popular as summer, except that lift-assisted winter sports have the greatest numbers of any user group.

Highways 26 and 35 make a very popular year-round loop route when connected with Interstate Highway 84 through the Columbia River Gorge. This route is designated as a State Scenic Loop, and Mt. Hood itself is the centerpiece it circumnavigates. Highway 224 and road 46 are part of a 75 mile National Scenic Byway that runs through Mt. Hood and Willamette Forests. In 2014 it was also designated a State Scenic Bikeway.

In 2010 the MTH implemented subpart B of the Travel Rule and designated a transportation system to meet projected future access needs for OHV users. Although it was recognized that the MTH is not a key OHV recreation destination of choice by OHV enthusiasts in the Pacific Northwest, a local user community has grown and popularized several areas. The forest now has four designated areas for OHV users where they can ride on specified trails and some roads.

Roads can be an integral part of the hunting experience for many. Roads provide access to favorite or traditional hunting sites and for many it is important to be able to get as close as possible with their vehicle to haul out the animal they have harvested. Some hunters seek areas of relative solitude to hunt. Roads provide access to favorite or traditional fishing sites. For many, such as disabled or physically challenged individuals, it is important to be able to get as close as possible with their vehicle.

One of the goals of the Forest is to provide wood fiber and other forest products to meet the needs of society for those products and to provide employment in local communities. Roads are used to access forest stands for these resource extraction activities. On average, the Forest provides approximately 30 million board feet of timber annually. Other forest products sold to commercial gatherers include firewood, evergreen boughs, beargrass, mushrooms, and landscaping plants. Rock is also sold from quarries and other sources. There are many personal use and subsistence uses as well including firewood, Christmas trees, huckleberries, mushrooms, medicinal plants, rocks, and cones.

Special uses on the MTH are extensive. Roads are used to access private lands and for other uses under special use permit. Summarized activities include:

- Driveways and roads to residences and more than 500 permitted summer homes
- Access to private timber lands
- Access to improvements and utilities such as dams, irrigation ditches, pipelines and power lines
- Access to privately managed lodges and camps
- Access for sporting events

- Historic reenactments
- Filming

Administrative use of the road system is critical to the operations and management of the Forest. Roads are used by Forest Service employees and contractors to conduct and manage a variety of Forest activities such as:

- Monitoring forest and aquatic conditions
- Planning future management actions
- Administering contracts and permits
- Maintaining campgrounds and trails
- Law enforcement
- Search and rescue
- Fire patrols
- Fire fighting
- Fuels reduction and prescribed fire
- Precommercial thinning
- Research
- Public education events
- Access to residences, ranger stations, guard stations, and Timber Lake Job Corps
- Access to mountain top communications sites
- Access to fire lookout towers
- Access to seed orchards
- Access to improvements such as dams, ditches, pipelines and power lines
- Fish stocking
- Noxious weed control
- Fence maintenance and livestock monitoring

The 2003 RA categorized all the access needs on the Forest into types and applied the scoring and ranking method to individual road segments as applicable. Scoring for each of the categories reflected weighted priority. The highest priority users were the general public, developed recreation, and administrative needs (Table 17).

Table 17 – Access Types from the 2003 RA Listed in Order of Priority.

Access Type by Priority
General Public
Developed Recreation
Administrative Site Access
Private Access
All or General Administrative

Other Agency Access
Dispersed Recreation
All Commercial Types
Timber Haul
Vegetative Management
Fire Suppression

Any single road segment could have multiple access types or priorities. The scoring was used to prioritize access needs. It also served as a basis for comparing those needs with the environmental risk ratings. **Table 18** shows the proportion of the road system by access need rating.

Table 18 – Percent of the Road System Miles by Access Need Rating.

Access Need Rating	Percent of Total Miles
Low	43
Medium Low	23
Medium	18
Medium High	5
High	11

The access need across the majority (66%) of the road system is low or medium low. That is because the majority of the road system is comprised of maintenance level 2 roads where there are few users, or where use occurs seasonally or periodically. The remainder of the system that has a medium to high access need is the roads that receive the greatest use by the most user types.

Public Input

An element of the TAP, as well as the 1999 ATM, the 2003 RA, and all the prior and subsequent official Decisions that entailed road related restoration, was to find out how people use the MTH and its road system. Asking them what we should consider as we develop a road investment strategy for the future was an important aspect of this and all those previous efforts. As we identified a road network for the future that best balances access needs with resource and financial concerns, we were genuinely interested in hearing from the public about their interests and creative solutions.

The Forest once again underwent a communication and outreach strategy to engage the public for this analysis. We focused our outreach efforts primarily on four public open house meetings that occurred on each of the four Districts in fall of 2014. Also, a series of web pages devoted to the effort, including a response form and shared email inbox for soliciting public feedback were made available on the MTH website. Forest Service staff also met with

congressional delegates, collaborative consortia, special interest groups, and advocacy organizations to hear their concerns. Media e-mails, press releases, and news articles were also distributed widely. Official notice was sent to tribal, other federal, state, and local agencies.

The outreach effort for this analysis is a continuance of dialogue, building upon all of the public input of past efforts, and will be used to help inform future project planning. Future site specific projects that become proposed will undergo the compulsory official Decision process required by the National Environmental Policy Act (NEPA), and will include a requisite public comment period, an analysis and disclosure of effects, and appeal rights. Though this TAP does not require a formal response to public comments, the feedback received was used to help re-evaluate road-related priorities from the array of the Forest's stakeholders and benefactors. In a broad sense, many of those strategic priorities have not changed since 2003, however, there have been some transformation regarding user patterns.

Most respondents recognized the need to maintain a road system that offers a variety of experiences for the diverse needs of forest visitors. Many visitors enjoy traveling on rough four-wheel drive roads to remote areas of the forest to seek out solitude and a rustic experience. Others enjoy traveling by passenger car to sight see, bird watch or visit historic sites. Many others enjoy gathering forest products and want to maintain access to firewood areas and sections of the forest where mushrooms, beargrass, and huckleberries thrive. Many folks acknowledged that the vast network of roads that were built in an earlier era when the production of lumber was a more focused objective is no longer the case, and has resulted in declining budget trends. They asked that a hard look be taken at identifying a road network that puts focus on priority routes with the needs of the recreation and timber industry in mind. There were many who expressed their displeasure with road closures and decommissioning, and felt that the expenditure would have been better spent on maintenance. Still many others advocated for an increase in road closures and decommissioning in order to enhance protection of natural resources, and re-focus management objectives to favor quiet recreation over other goals.

Native Americans expressed their interest in traditional uses and the need to access areas important to their culture. Those who offer volunteer services on the MTH advocated for easy access to the Forest's network of hiking trails and developed recreation sites. There was a contingent of users that advocated for maintaining access to dispersed recreation and non-fee sites. Hunters were interested in maintaining roads below steep grades and bordering hunting grounds to allow for game retrieval. Road cycling and mountain biking users highlighted their growth, and emphasized the continuing growing popularity in bike tourism that has become an important part of certain local economies. Cyclists asked that certain routes be maintained in a paved status, while others wanted closed roads be converted to mountain biking trails. Several commenters brought up the responsibility of the Forest to maintain passenger vehicle and four-wheel drive access throughout the forest so that disabled or elderly visitors are able to access and enjoy their pursuits. Equestrian groups expressed their preference to enhance maintenance too trailheads so that horse trailers can better be accommodated. Winter sports enthusiasts made vocal their appeal for keeping road surfaces in a condition useful to their pastime when snow depths are low.

The level and depth of the response from respondents demonstrated their interest, passion and concern for the MTH and the feedback of so many citizen stewards highlights their concerns and issues. It is apparent that people and local communities depend on some of the Forest's roads more than others. Road related priorities in response to public feedback can be listed as:

- Routes that link state and county roads, and connect high-use entry points or population centers, providing major access into and through the Forest.
- Roads that help provide the most extensive linkage to secondary networks.
- Roads that are designated scenic routes or auto tours.
- Roads that provide access to recreation areas, which contain a number of developed sites and facilities
- Routes that extend primary Forest roads as well as state and county roads, and give needed long-term access.
- Roads that give the best access to management areas outside the proximity of the primary network, considering that these areas cannot be accessed by short-term, temporary roads.
- Roads that access dispersed sites, wilderness trailheads, multiple resource management areas, and special sites and facilities.
- Long-term roads that are supported by cooperative share-cost agreements or other partnerships and open to public travel.

Recreation

The Mt. Hood National Forest has an abundance of year-round recreation opportunities for local residents, and visitors from around the world. The forest is very accessible from the Portland metropolitan area, as well as to the adjacent local communities. The existing Forest transportation system provides access to a variety of dispersed and developed recreation facilities and areas, trails and trailheads, scenic landscapes, and special areas, including wilderness. Therefore, as the transportation system changes, the impact to access for recreation should be considered.

Public demand for certain recreation opportunities, particularly day trips, is expected to grow. The future trends for recreation use on federal land indicate there will be an increase in public participation in downhill skiing, visiting interpretive sites, hiking and birding; and trends show a general decline in hunting, snowmobiling, motorized off-road and fishing (White, et.al., 2014). From the 2011 National Visitor Use Monitoring (NVUM) study for the Mt. Hood National Forest, the top five activities visitors identified participating in were: downhill skiing, relaxing, viewing natural features, hiking/walking and driving for pleasure. When asked what their main activity was for their trip, the following activities were identified: downhill skiing, hiking/walking, cross-country skiing, viewing natural features and relaxing (NVUM, 2011). Driving for pleasure was ranked as 14 out of the list of 29 main activities for visiting the forest. This indicates that many people view driving for pleasure as a part of their recreation experience, but typically not the primary reason for visiting the forest. At the time the 2003 RA was drafted, the primary recreation use on the forest was seen as driving for pleasure. Since this time, the latest forest visitor monitoring report ranks downhill skiing as the number one recreation activity based on the number of people participating and the number of people identifying that as their main reason for visiting. Since the 2003 and the 2011 NVUM report, there is anecdotal information that road cycling has increased on the forest in some areas. This was highlighted during the public scoping process.

Since the 2003 Travel Management Plan there have been some changes that effect the direction or goals for road system as it relates to recreation resources. As well, there have been changes in the

use patterns of the forest visitors. The following changed conditions were considered while identifying locations where the Access Rating may need to be updated.

Off-Highway Vehicle Use - This most significant change to the management of recreational motorized used was the decision signed for off-highway vehicle use in 2010. This decision was a result of the planning effort directed under the Travel Management; Designated Routes and Areas for Motor Vehicle Use; Final Rule [Federal Register Vol. 70, No. 216 (2005)], which changed the direction for management of off-highway vehicles (OHVs). This decision designated OHV routes, areas and staging facilities where OHV use is allowed. The decision amended the Forest Plan to close the remaining portions of the forest to off-highway vehicle use.

The addition of the developed of a new recreation site (staging facilities) changes the access rating and possibly the objective maintenance level for the road accessing these areas, and changed the management direction for roads that had formally been open to OHV use.

New Wilderness Designation - Under Omnibus Public Land Management Act of 2009 (Public Law 111-11), wilderness areas were added and expanded on the forest under the Wilderness Preservation System (Wilderness Act (16 U.S.C. 1131 et seq.). Except as specifically provided for under the Wilderness Act, and subject to existing private rights, no permanent roads will be within wilderness areas, except as necessary to meet minimum requirements for the administration of the area for the purpose of the Act (including measures required in emergencies involving the health and safety of persons within the area). The roads that are within these new wilderness boundaries are closed to vehicle traffic and either decommissioned, or set to be decommissioned pending site-specific analysis.

This designation would not change the Objective Maintenance Level for roads leading to the wilderness boundaries, or the access need rating. The Objective Maintenance Level for roads within the boundaries of the new designations is now decommission, pending site-specific analysis and funding to complete the decommissioning work.

New Wild and Scenic Rivers designations - The Omnibus Public Land Management Act of 2009, amended the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) to add nine river segments within the Mt. Hood National Forest. The new wild and scenic rivers designations do not preclude the use of roads but could change the management objectives of the roads under future river management plans or future analyses for site-specific projects.

Mt. Hood National Recreation Area designation – Also under the Omnibus Public Land Management Act of 2009, an area was designed a National Recreation Area to provide for the protection, preservation, and enhancement of recreational, ecological, scenic, cultural, watershed, and fish and wildlife values. This designation calls for no new or temporary roads to be constructed or reconstructed within the Mt. Hood National Recreation Area (NRA) except as necessary: (1) to protect the health and safety of individuals in cases of an imminent threat of flood, fire, or any other catastrophic event that, without intervention, would cause the loss of life or property; (2) to conduct environmental cleanup required by the United States; (3) to allow for the exercise of reserved or outstanding rights provided for by a statute or treaty; (4) to prevent irreparable resource damage by an existing road; or (5) to rectify a hazardous road condition.

This designation does not trigger a change in the Objective Maintenance level for the roads or the Access Rating, but the designation will be a consideration during site-specific decisions within the NRA.

Recreation Facility Analysis (RFA) - The RFA process developed proposed actions for management of forest recreation sites in order to meet the desired future condition that aligns with the Forest Plan. For purposes of the analysis and planning, the recreation sites that no longer fell under the unit niche; were not environmentally sustainable; were not supported by local communities; and did not have a sustainable management cost-benefit ratio were identified as sites to be closed. Some of these sites have been closed, and others are still to be closed.

Under site-specific environmental review, a decision may be made to restore these sites completely, or to convert them in a way to accommodate dispersed recreation opportunities. These changes may change the Access Rating or Objective Maintenance Level for roads leading to these sites or areas.

Special Uses, Licenses, Easements and Utility Providers – During site-specific analyses, there will be an opportunity to examine roads management objectives for uses other than public access needs. If the only need for the road is to provide access for a permit holder or single user, and is not needed for the access or management of the surrounding lands, the forest may consider placing the road under permit for operations and maintenance or the Access Rating may need to be updated for new uses. No new uses changed any access ratings under this analysis, but will be a consideration under future site-specific decisions.

Access to developed sites - Developed recreation sites are typically those areas requiring facilities to support concentrated use; for example, a campground, picnic area or trailhead. Developed sites can include infrastructure such roads, designated parking, picnic tables, toilets, drinking water, or buildings. Roads accessing these areas are identified as having the second highest access need – second only to the General Public access need. Some public comments specified a need for the forest to provide two-wheel drive access to all trails; some comments requested additional maintenance to roads accessing equestrian trailheads to accommodate vehicles towing horse trailers; and other comments were general comments about maintaining access to developed sites.

Roads to trail conversions – many comments suggested converting decommissioned roads into to trails. There is agency policy directing how to evaluate the conversion of roads to trails. This direction focuses on site specific analysis for each situation. When considering converting unneeded roads to trails, the following would be considered:

- Whether the route would provide a recreation experience consistent with desired trail management objectives;
- Environmental effects of the continued existence of the route;
- Need for mitigation, removal, repair, or alteration of structures along the route, and
- Long-term trail maintenance and available funding.

In recommending a conversion, the converted route should meet the trail management objectives and provide the desired recreation experience; adequate funding should be available to convert; and maintain the route and the environmental effects of the converted route should be acceptable to the responsible official. Since this is a site-specific decision process, road to trail conversions were not identified through this process.

Maintain or Increase Road Access –The forest received comments which supported maintaining as many roads as possible. From those who supported maintaining the current system and opposed

road closures, those comments ranged from general to specific. Comments included the case for providing access to those who may not be able to hike into the forest and need motorized access to access the forest. This category of comments also included requests to keep roads up to the wilderness area boundaries in order to provide shorter hikes into the wilderness area destinations.

Decrease Road Access – The forest also received comments which supported a decrease in the number of roads on the forest, to limit motorized access and to pull roads away from wilderness boundaries. Wilderness designations do not require a buffer zone, and site-specific actions would be analyzed under project-specific decisions.

Maintain roadway pavement for road cycling opportunities – there was a group of comments specific to maintaining and improving road pavement for cycling opportunities. These comments were very specific to certain roads on the forest. There was also a comment concerned that cycling activities would be limited. Road cycling is not a prohibited use on forest roads, but road cycling is not a use for which the roads are maintained to accommodate. Maintaining pavement is not a sustainable goal under the current road maintenance objectives or the current or expected budgets. For roads to be paved specifically for recreation opportunities there would need to be site-specific environmental analysis and a partnership or agreement formalized to fund the additional costs. This is a unique use which is not supported by management direction for roads or recreation directives or budget allocations.

The future road system continues to prioritize access to developed recreation sites, which include campgrounds, picnic areas and trailheads. In the future, there may be opportunities to maintain roads through permit holders such as in situations where the primary access need is for utility operations and maintenance. Driving for pleasure will continue to be an opportunity available for forest visitors, and the variety of those opportunities will range from Scenic byways and highways to high-clearance roads with lower maintenance levels. The change over time may be a reduction in overall road miles, and a high number of roads with lower maintenance levels in the more remote parts of the forest. During site-specific analyses for roads, access to recreation opportunities should be considered, along with the options for road-to-trail conversions, decommissioning roads in wilderness, maintaining access for horse trailers to equestrian campgrounds and trailheads and access for trail maintenance needs along the PCT.

Heritage

The Forest Service's Infrastructure database (i.e., Infra), which is the agency's corporate information management system where historical data is generally archived, has limitations because not all of the Forest's historical records have been entered into it. Because there is a vast body of data available but not in different archives, the relationship that roads have with the Forest's historic properties is typically analyzed on a site-specific, project scale basis.

Official NEPA Decisions pertaining to roads are evaluated in accordance with National Historic Preservation Act requirements. As projects emerge in the future involving roads, they will be analyzed specifically on a case-by-case basis. In general, issues related to roads and historic properties (both archaeological and above ground) include maintenance, interpretation, public use, historic routes, and tribal relations.

Archaeological sites and historic properties – It is known that numerous archaeological sites on the Forest have been directly impacted by the initial road construction, continued road maintenance and erosion, which unmitigated results in irretrievable data loss. Through continued monitoring, numerous sites have been identified throughout the Forest which would benefit from road closures and/or rehabilitation. Remnant deposits of sites could be preserved by stabilizing eroding surfaces such as road cuts. Archaeological sites such as those found on Forest are not appropriate for on-

site interpretation that might favor public access because of their fragile nature and confidential locations.

In order to analyze the effects of the current road system on archaeological sites and historic properties it is necessary to correlate the locations of each site and examine site-specific information for evidence of impacts. There have been over 1,400 archaeological sites documented on the Forest. Documentation exists in the form of paper file records (survey and site forms) and the INFRA Heritage Module database. The database can be used to produce reports in tabular form, listing sites with documented road impacts. This database is only as good as the data that is entered into it and is only a snapshot in time of the condition of sites.

Using existing data to conduct an analysis of the effects of the road system on archaeological sites would require the comparison of site locations obtained from these records with the current road system. A cumbersome and time consuming process, analysis would be best accomplished at a district or watershed scale, where more specific information is available. For those sites located within the road prism, the damage has already been done with the initial road construction, which in many cases has caused the site to be irretrievable.

Maintenance and Protection of Historic Properties – Historic sites, especially structures, are more conducive to adaptive uses such as interpretation and recreation rentals, so access for interpretation as well as maintenance may be more desirable in some cases. Some historic structures are currently used as administrative facilities (e.g., fire lookouts), requiring other access considerations. Other historic structures are not being utilized or maintained by the Forest, but may receive high visitor use. Access is desirable for sites of this type from both the maintenance and public use perspective.

There are around 70 historic structures currently listed on the Forest inventory. Records and information about these properties exist in the same form as detailed above for archaeological sites. Comprehensive specific data on maintenance and efficiency and costs are not readily available, but may be obtained through records search and interviews, primarily at the district level where most maintenance and management is undertaken.

As a general rule, properties with road access have been more often utilized and more efficiently maintained. In exception to this are properties which are accessible by road (or short trails), but are more remote from. Often these properties are the target for public abuse/vandalism. Costs associated with maintaining these properties are relatively high. Additionally, the kinds of archaeological sites found on this Forest would not typically require maintenance unless the site has been impacted by other management or public activities. Then there would be fewer occurrences of such damages in areas where access is limited.

Interpretation and Public Use of Historic Sites and or Other Cultural Resources – Some historic properties are utilized by the public and for interpretation. Generally, such uses are associated with recreation and could be addressed as such. Interpretive efforts are generally focused along the main travel routes in area of high public use. Interpretive panels are currently found along many main travel routes and in recreation sites (Highway 26, Highway 35, various trailheads). Interpretation of more fragile archaeological sites takes the form of off-site interpretation, such as brochures or displays.

Recreation is probably the most common “adaptive use” of historic structures on the Forest. Interpretation is a national priority for the Forest Service’s Heritage Program. It would be desirable to maintain access to interpreted heritage sites, though not necessarily strictly by road access.

Trails can also provide adequate access in many cases. The public use through the Recreation Rental program is another important priority for the Heritage Program. Maintaining adequate access to proposed or potential rentals is desired. Table 19 lists the current recreation rentals of historic structures and the roads that provide access to them. Table 20 lists proposed and potential rentals of historic structures and the roads that provide access to them.

Table 19 – Historic Properties Available for Use by the Public

Current Historic Property Rentals	Access Road(s)
Fivemile Butte Lookout	FSR 44 and 4430, FSR 4430-120, then turn left and follow to spur road 122.
Flag Point Lookout	FSR 44, FSR 2730 to spur road 200, FSR 2730, which leads to the 2730-200 spur
Olallie Lake Guard Station	FSR 46, FSR 4690, FSR 4220.
Olallie Lake Resort	FSR 4690 and follow the signs 13 miles to the Lake.
Silcox Hut	Access road
Clear Lake Butte Lookout	FSR 42, 42 to the 240 spur road and on to the lookout.
Lost Lake Resort	FSR 1341-620
Tilly Jane A-Frame & Tilly Jane Cabin	Cloud Cap Road
Clackamas Lake Ranger House	Skyline Road/Forest Road 42.
Devils Peak Lookout	FR 2610/Still Creek Road
Summer Home Tracts: All roads within Mile bridge, Still Creek, Camp Creek, Vine Maple, Zigzag Ski Club, Flag Mountain, Old Oregon Trail, Tollgate	Multiple roads

Table 20 – Historic Properties Proposed for Public Use or that have Potential Use

Proposed or Potential Rentals	Access Road(s)
Bagby Guard Station	Trail and FSR 70
Olallie Meadows Cabin	From FSR 46, to FSR 4690, and then FSR 4220.
More facilities at Clackamas Lake Guard Station	Skyline Road/FSR 42.

Historic Transportation Routes – Many historic transportation routes, such as old wagon roads, trails and railroad routes have been adversely affected by road development. As transportation systems change over time, modern roads often followed the existing historic routes. In some areas this resulted in obliteration or fragmentation; but, in some places pristine segments have survived. In some cases, current roads could be closed and routes rehabilitated to a historic character. Some could be converted to interpretive trail routes.

The process for conducting analysis of this category of heritage resources is similar to those above in that it relies on review of existing heritage resource records. Many of these routes are fairly well documented in the archives; many have been field verified and recorded. Some have eligibility evaluations and management plans in place. When road decommissioning or other road management activities are being considered, an archaeologist should be consulted in order to assess the potential historic values of the road system under consideration. The Forest has undergone several phases of aggressive road decommissioning where the heritage resources have been identified and avoided. The use of historic records and maps should be consulted to identify other unevaluated minor routes. **Table 21** is a list of the historic transportation routes on the Forest.

Table 21 – Historic Routes on the Forest

Historic Transportation Routes
Barlow Road-Eastern Forest Boundary to White River Station
Barlow Road-White River Station to Barlow Pass
Lost Lake Resort Road
Abbott Military Road
Cloud Cap Wagon Road
Barlow Road Summit Compound
Barlow Road Laurel Hill to Tollgate

West Leg, Timberline Road
Segments of the Loop Highway
Oak Grove to Oregon City Wagon Road
Skyline Road

Tribal Relations – Currently the Forest works with two federally recognized tribes who have ancestral ties to the land within Mt. Hood National Forest boundaries. These are the Confederated Tribes of Grand Ronde Community of Oregon and the Confederated Tribes of Warm Springs. Both the Grand Ronde and Warm Springs assert their claims to ceded lands within the Forest boundaries: The Warm Springs consider their ceded lands the entirety of the Mt. Hood National Forest as the Grand Ronde consider their ceded lands the Clackamas River Basin up to the South Slopes of Mt. Hood.

The extent of which forest lands are currently utilized by Native Americans for traditional cultural practices is not well-known to forest managers. Some of their important tradition uses include resource procurement such as cedar, huckleberries, medicinal plants, personal, and or spiritual reasons. Recently, increased consultation and interactions with local tribes indicates that there is considerable interest in using some areas of the Forest for cultural activities. Understanding these interests and needs will be facilitated by continued interaction and relationship building with the tribes, particularly on a project or case-by-case basis. Meetings with both the Confederated Tribes of the Grand Ronde Community and the Confederated Tribes of Warm Springs will be ongoing so that they can communicate where road access is important for their use, or where roads are a hindrance to their interests.

Vegetation Management

The Mt Hood National Forest Vegetation Management Program contributes to the health and vitality of the Forest as well as to the communities that surround it. Straddling the Cascade Range, the Forest encompasses a broad range of ecotypes from its western to eastern boundaries and vegetation management treatments vary along with it. Additionally, increased population and associated social pressures in the region have further diversified the suite of treatments the Vegetation Management Program implements, and the products it produces; currently including, but not limited to:

- Commercial and non-commercial treatments to maintain and improve forest health and resiliency
- Introduce variability and enhance diversity and complexity across the managed landscape
- Reduce hazardous fuels in and around the wildland urban interface and fire adapted eco-types
- Maintain and improve tree growth in managed stands
- Provide forest products and associated jobs to local economies
- Enhance traditional tribal uses
- Reduce the risk of wildland fire from spreading to, through or from Forest boundaries

- Maintain and improve wildlife habitats
- Assist in removing danger trees along roads to provide safe public travel
- Reforestation of areas affected by wildland fire.
- Detecting and management of noxious weeds.

Special Forest Products, both commercial and non-commercial, most typically include:

- | | |
|-------------------|--------------------|
| • Firewood | • Huckleberries |
| • Mushrooms | • Salal |
| • Boughs | • Medicinal Plants |
| • Beargrass | • Posts and Poles |
| • Christmas Trees | |

The sale of commercial timber through Stewardship Contracting has also produced funding (retained receipts) for numerous restoration and road maintenance projects both on and off the Forest and has contributed approximately \$500,000 per year towards projects that have a restoration focus (e.g., replacing fish barrier culverts, decommissioning unneeded roads with resource sensitive issues, armoring popular recreational trails adjacent to streams, piling of hazardous fuels, etc). Funding for sale area improvements through standard timber sale contracts also provides for restorative activities.

In addition to restoration projects, the sale of commercial forest products also supports the repair and maintenance of the Forest road network, allowing the public safe travel to recreational sites and experiences, and access to numerous special forest products. In 2014, purchasers of commercial forest products accounted for approximately 30 percent of the Forest's annual road maintenance accomplishments. Since the majority of allocated road maintenance funds are spent on mainline roads, most local and collector-type roads would receive almost no maintenance and repair without purchaser contributions.

Approximately 27 percent (1,131 miles) of the Forest's Mt. Hood National Forest road system has been, or is scheduled to be, removed (decommissioned) from the Forests' system of maintained roads, left in hydrologically stable condition and closed to public use. Some of them however may be useful for future management. Decommissioning efforts of the past have removed access to an estimated 50,000 acres of previously managed stands (i.e., plantations). Where resource risks do not outweigh access needs, some of these old road prisms (estimated 80 miles) could be available for temporary use as a means to minimize a disturbance footprint by using the old one again. Such re-use would have to be determined based upon findings and decisions made through the NEPA process. In addition, as the Forest evaluates future management and shifting public access needs, additional roads may be needed in areas that are not currently accessible. Due to the intensive nature of previous management activities across the Forest, it is likely that new, permanent road construction would be rare.

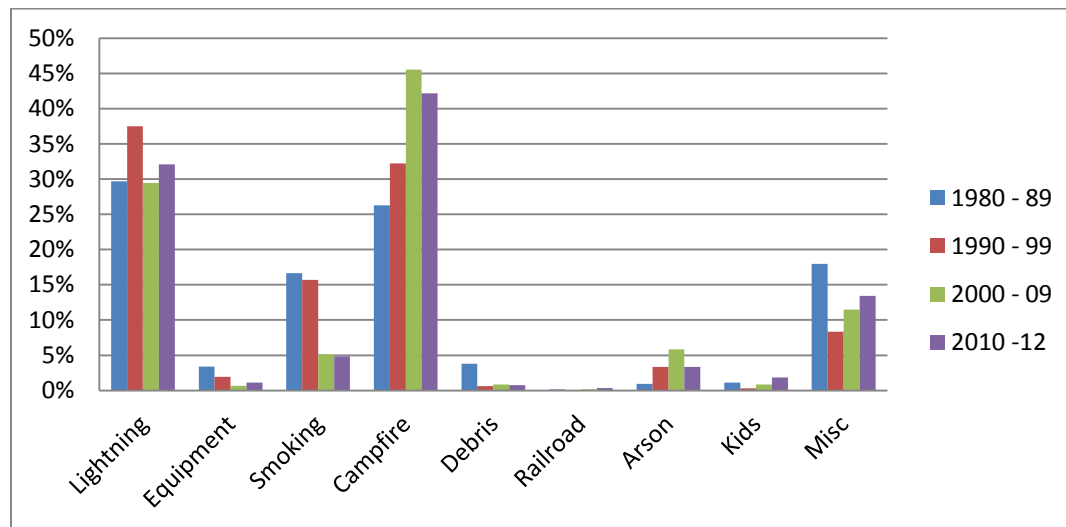
In stands less than 80 years old where system roads provide access, future forest management would potentially be planned, particularly where prior clearcut harvest took place. In late-successional reserves these stands provide opportunities for forest restoration. In matrix allocations previously managed stands provide opportunity for future silvicultural treatment and wood production. System roads in matrix lands would be important at some point in the future to support forest management objectives. Similarly, areas where forest health such as large patches of pathogen outbreak or insect infestation becomes an issue, access could be equally important.

WildFire and Fire Suppression

The overall goal of fire management on the MTH is to support land and resource management goals and objectives consistent with the LRMP Standards and Guidelines, and the NWFP. The fire program includes all activities for the protection of resources and other values from wildland fire. Our initial attack suppression resources rely on the road network to rapidly access and extinguish unwanted fires while they are still small.

The existing road network is an integral part of the Forest fire management strategy for both fire suppression and fuels management. Roads provide access that increases the scale and efficiency of fire suppression, and roads create linear firebreaks that may affect fire spread. More importantly, road locations influence both strategic and tactical fire control decisions. The downside is that road access undoubtedly contributes to increased frequency of human-caused ignitions (Gucinski 2001). About 70 percent of all fire starts on the Forest are human-caused ignitions (Figure 5). The greatest densities of these ignitions are in highly visited areas and campgrounds mostly along major road corridors.

Figure 5 – Fire Starts by Cause on the MTH. [Change the chart's symbolism to B&W for ease to copy]



More important than just any single road, is a safe maintained network of roads that allow access and regress from multiple connectors to strategic areas across the Forest. In general, roads need to be evaluated on a project and case-by-case to determine the effect of closure or decommission on fire related issues., but it is important to maintain the big picture of how the network of roads in area provide access and other options for safe fire suppression and management.

Similar to the MTH Strategic Fuel Treatment Plan, which outlines strategies for how, when, where, and why to prioritize and conduct fuel reduction activities, there are rationale for identifying roads most important for suppression actions or that provide emergency ingress and egress. Some considerations for identifying fire-related access needs include:

- Identify primary routes that provide safe ingress and egress around wildland urban interface, high values at risk, developed recreation sites, and facilities.
- The road network should support the objectives of Community Wildfire Protection Plans of neighboring landowners, as well as the MTH Strategic Fuels Plan.

- Work with the Oregon Department of Forestry (ODF) and other partners to insure changes to the road network do not affect the ability of cooperators to access lands for which they have fire protection responsibility.
- Retain for suppression purposes roads located adjacent to, or that encircle, blocks of unroaded areas such as wildernesses or designated roadless areas so as to be able to respond to wildfire escapements from those areas.
- Recognize primary routes useful for providing multiple connections or a box/loop that could facilitate fire containment, particularly around high values at risk.
- Roads that are adjacent to, that access, or encircle private lands are valued for incidents potentially affecting multiple land owners or private in-holdings.
- Provide access to water sources, ridgetops and to high spots to increase the efficiency of fire detection and suppression.
- Minimize the number of roads that are mechanically blocked, unsafe or deteriorating that still allow public access (ATV's, UTV's, dispersed camping) but limit safe fire fighter access with firefighting equipment.
- Roads located mid-slope or that are dead ends present a hazard for fire fighters.

Appendix 7 lists some of the primary values at risk on the MTH and the roads that access them. Nearly all of the roads associated with accessing these values have been identified in the 2003 RA as having a moderate or higher access need. They include primarily two- and four-digit arterials and collectors, but also a few secondary spur routes.

Some of the high values at risk listed in **Appendix 7** are also areas where there is a preponderance of dead and dying trees mixed within the dense live forest as a result of bark-beetle or defoliator insects. The fuel load is high or very high. Emergency egress could become a necessity should a wildfire encroach into these areas with the suited mix of conditions. They include:

- Olallie Lake Scenic Area
- Sisi Butte
- Timberline and Government Camp WUI

Desired Future Condition

The road system provides a good balance of meeting access needs while reducing effects to natural resources and reduced maintenance costs.

- The Forest transportation system provides access routes through the MTH within expected budget allocations.
 - Responsible officials coordinate with other public agencies and private stakeholders to identify and integrate current access needs and balance these with transportation system costs and resource concerns.
 - The road system provides the right amount of access for transportation, recreation, heritage, vegetation management, and fire program needs.
-

- Access needs and locations to support traditional uses has been identified and facilitated.
- Effects of the road system to natural resources have been minimized.
- Cooperators, special use permit holders, and commercial enterprises have adequate access.
- Reasonable accommodations have been provided to developed recreation sites.

Environmental Issues

Roads can pose risks and adverse impacts to valuable natural resources. Minimizing unwanted effects of roads is a restoration goal.

The MTH has analyzed the effects of its road system many times and at many scales. From evaluating drainage structures at specific points, to conducting condition assessments on individual road segments, to analyzing the effects of roads across a planning area, to landscape and watershed-scale assessments, to broad forest-wide analyses...the impact of the transportation network has been quantified, qualified, and disclosed over and over. The 2003 RA is one of those. It generated a set of resource risk ratings that are still relevant today and useful for project and transportation planning.

Current Situation

One of the outputs of the RA methodology was a composite environmental risk score which then was used to generate an overall qualitative resource risk rating that combined all the resources evaluated. Table 22 displays the results of how the current road network is rated in terms of overall resource risk, which can be useful in identifying the context and extent of the system's effects and the relative need to minimize them.

Table 22 – Percent Miles of System Road by Composite Resource Risk Rating

Composite Resource Risk Rating	Percent Miles of Current System Roads
Low	18
Moderately low	52
Moderate	22
Moderately high	7
High	1

The percentages by composite resource risk rating in Table 24 reflect several key factors. First, the composite scores are weighted averages, which tend to narrow the variation about the mean so that the highs and lows are represented less strongly in the data. Next, the east zone does not have a lot of streams compared to the west zone and thus many system roads on the east side of the Forest have a low aquatic risk. Likewise, much of the terrain in the high Cascades is relatively gentle and thus road effects are not as physically manifested. The prevailing reason however is because the primary travel routes, the arterial and collector roads (ML 3-5) make up the smallest proportion of the road system but are often located within and parallel to the drainage bottom. They typically are the roads that experience the greatest amount of traffic, have been in place a long time, and have received the highest frequency of maintenance. Many of their miles have been reconstructed to a higher standard of design.

But the relatively low percentage of roads rated as moderately high or high is also attributable in part to all of the past work that has been completed over the last several decades to reduce the effects of individual system roads. For example, there have been hundreds of miles of road closed or decommissioned in an effort to minimize unwanted impacts to aquatic and water resources, such as in the Bull Run and Mill Creek municipal watersheds and the Clackamas tributary known as Fish Creek for example. There have also been hundreds of road miles closed to minimize adverse effects to wildlife and other biological resources.

Although much has been done to correct or minimize effects of the road system, there continues to be additional work to pursue. At the road segment and watershed scale there are effects that remain, and represent opportunities for continued restoration to minimize them. It is recognized that as long as a road system is on the landscape, efforts to minimize unwanted impacts is ongoing. Restoration priorities may be achieved, but the remaining road network will always require maintenance to keep road effects attenuated.

To evaluate further the balance of access needs with resource and economic concerns, finer resolution of assessment can be useful. Further detail and discussion of the risks that were rated in the 2003 RA includes aquatic, fisheries, watershed, wildlife, and invasive plants to better inform approaches to achieve that balance.

Aquatics and Watershed Resources

Results of the 2003 RA have been found to still be useful, and so they were used to inform the TAP. The methodology of the RA to evaluate the potential risk of road-related impacts upon aquatic, fisheries, and watershed resources employed a scoring and ranking process to assess individual road segments ([Appendix 8](#)). The method was a science-based means for objectively evaluating the entire road network across the Forest at a rather fine scale. A series of subfactors were elements in the scoring methodology. They were the principle elements that, when combined, provided a composite rank of the overall risk of a road to the aquatic system. These subfactors, some of which can be considered static while others would be less so, included individual analyses of:

- Roads within 200 feet of waterbodies
- Presence of anadromous and/or resident fish
- Fish passage
- Landslide hazard
- Surface erosion hazard
- Hydrologic hazard (rain-on-snow)
- High-risk stream crossings
- Stream crossing density
- Roads within 200 feet of wetlands

Combined together, the scoring that resulted from the individual analyses of the subfactors computed into the composite aquatic risk rating. [Table 23](#) shows the breakdown of the composite aquatic risk ratings applied across the miles of system roads currently on the Forest.

Table 23 – Percent Miles of System Road by Composite Aquatic Risk Rating

Composite Aquatic Risk Rating	Percent Miles of Current System Roads
Very Low	29
Low	39
Moderate	19
High	9
Very High	<1

By 2003, over 100 miles of system roads had been decommissioned in an effort to reduce unwanted effects of the road system to aquatic and water resources, more than another 100 or so had been closed to motorized use.

The Mt. Hood National Forest has been actively managing the road network to reduce aquatic risks since the 1990's. Starting with the implementation of the Northwest Forest Plan (USDA 1994), watershed analysis was used to help inform and guide the management of the road system in key watersheds and in land allocations where the primary emphasis was focused on watershed and aquatic ecosystem health. Shortly thereafter, the 1996 floods occurred and road decommissioning and closure were aggressively pursued in order to reduce risks to natural resources. The Fish Creek watershed and aquatic resources were severely affected by the flood event and over the course of several years; the road system in the watershed was significantly reduced (Appendix 8).

The 2003 RA was the basis for the implementation of the Forest's Legacy Roads program. Decisions that were to ensue would be completed in incremental phases over the course of a decade. Known as the "Increment Strategy", it was initiated in 2008. Its approach was to group priority river basins and focus watersheds as a means of prioritizing road-related restoration needs that would be in alignment with the Region 6 aquatic restoration strategy.

The strategy identified the planning, implementation, and monitoring actions that would ameliorate road-related impacts on aquatic resources; particularly water quality and fish habitat – especially for Endangered Species Act-listed salmon, steelhead, and bull trout. Additional benefits were expected for a variety of terrestrial and riparian-dependent wildlife species. The goals of the strategy were to:

- Plan and implement road-related activities to restore adverse hydrologic impacts; thereby improving water quality and fish habitat.
- Actively involve citizens, adjacent landowners, tribal governments, and other stakeholders through dialogue, collaboration, and NEPA planning.

The strategy aimed toward planning road-related restoration activities in an open and transparent manner that fully engaged the public and key stakeholders in a collaborative manner utilizing the best available, site-specific information and data.

Specific objectives of the strategy were to:

- Review and assess all Forest Service roads at the watershed-scale to determine the long-term transportation system that meets our public and management needs, and that is in line with expected budgets.

- Improve watershed health and restore water quality and fish habitat conditions where there are adverse hydrologic impacts associated with the transportation system through implementing restorative actions.
- Improve habitat conditions for terrestrial and riparian-dependent wildlife species.
- Actively engage the public, adjacent landowners, tribal governments, and other key stakeholders to identify issues, concerns, and opportunities for decision-makers (i.e., District Rangers and Forest Supervisor) throughout the planning process.

As a result of the increment strategy, significant work has been accomplished to reduce the risk of road related impacts to aquatic resources (Table 24).

Table 24 – Decisions Propagated from the MTH Increment Strategy (Legacy Roads).

Increment	Project Name	Watershed(s)	Date of Decision	Open Road System (mi.)	Long-Term Road Closures (mi.)	Pct. Road System Planned for Closure
1	Bull Run Watershed Management	Bull Run River, Little Sandy River, and others	12/2006	301	136	45%
1	2008-09 Forest-wide Aquatics Restoration	Salmon R, Still Cr, Upper Middle Fork Hood River, 15-mile	12/2008	269	76	28%
1	Upper Clackamas Road Decom	Upper Clackamas River	05/2009	314	113	36%
1	Lake Branch Thin T.S.	Lake Branch	06/2009	44	7	16%
2	Zigzag R.D. Road Decom	Upper Sandy & Zigzag Rivers, and Still Ck.	4/5/2010	127	44	35%
2	Clackamas R. Road Decom	Collawash	3/16/11	440	170	39%
3	Barlow/Hood R. Rd. Decom	White River & Tygh Creek	In Progress	In Progress	In Progress	In Progress

Prior to the Increment Strategy in 2008, road-related restoration opportunities were sought in Special Emphasis watersheds identified in the LRMP, and Key Watersheds designated by the NWFP. About 475 miles of roads have been decommissioned in those designated watersheds. In 2013 the Forest Service began the Watershed Condition Framework (WCF) across the Nation, which is a consistently applied methodology for evaluating

watershed health at the landscape scale and prioritizing where restoration should be implemented. Two “priority” watersheds were identified on the MTH, the Upper West Fork of Hood River and Still Creek. Both were analyzed for road-related restoration opportunities in Increment #2. About 23 miles of road have been decommissioned in those priority watersheds.

All of this past work exemplifies the principle rationale for so much road decommissioning and closure over the last twenty five years, to minimize effects of the road system on aquatic, fisheries, and watershed resources on the MTH. Efforts to minimize road-related effects will continue to be ongoing.

There are about 47 miles of road where the aquatic composite risk rating is high and the access need is rated as high too, which are mostly on the main arterial routes, improvements to structures to reduce impacts is an opportunity. But funding will remain a challenge because some locations are currently on deferred maintenance lists and will need capital improvements. About 145 miles of road have a high risk rating and a low access need. These are the more distinct segments of road where restoration pursuits can be prioritized, particularly those in steeper terrain where slopes are unstable, or those that are parallel and in close proximity to a stream reach (Appendix 3). Focus will be in Priority watershed identified during updates of the Watershed Condition Framework, Key Watersheds in the NWFP, and the Special Emphasis Watersheds of the LRMP.

There have been changes since the 2003 RA that if evaluated may indicate that a resource risk rating for aquatics may need to be revisited or changed. Zone specialist underwent a “changed condition analysis” to determine if the composite aquatic risk rating, or any of its sub factors, should be reassigned. The conditions that were evaluated included:

TES – New, or changes to, species listings for Endangered Species Act (ESA) TES species, the Regional Forester Sensitive species, and Critical Habitat listings.

Fish Barriers – Remedied barriers that now provide upstream passage to newly available habitat.

Fish reintroductions – Significant changes in fish distribution, such as bull trout in the Upper Clackamas River.

Physical Environment – Changes to Landslide Hazard, Surface Erosion Hazard/ Soil Resource Inventory that were used in the 2003 analysis.

High-Risk Stream Crossings – Newly identified high-risk crossings or remedied ones where the culvert has been removed.

Municipal Water – New source watersheds or re-configured boundaries.

Water Quality Restoration Plans – Restoration activities to minimize unwanted effects to water resources from past land use.

Watershed Condition Framework – Restoration activities or newly identified risks in high priority watersheds of Still Creek and the West Fork of Hood River.

Review of these items concluded that the aquatic resource risk ratings and sub-factor ratings from the 2003 RA were still applicable. Since there had been a plethora of work completed in the past to reduce effects of system roads on aquatic and watershed resources, many miles of high risk roads were already removed from the system. Ratings assigned to the remaining roads continue to be useful for identifying and prioritizing road-related restoration needs.

Fisheries

Over 1,500 miles of streams on the Forest provide important habitat for native populations of fish. Approximately 300 miles of these streams support anadromous fish populations. Approximately 300 miles of

these streams support anadromous fish populations. Many of the fish species and other aquatic organisms on the Forest are listed as threatened and/or sensitive (Table 25).

Table 25 – Threatened and Sensitive Aquatic Species on the MTH.

Endangered Species Act Listings	Forest Service Region 6 Sensitive Species List
Lower Columbia River steelhead (<i>Oncorhynchus mykiss</i>), listed Jan. 2006	Barren Juga (<i>Juga hemphilli hemphilli</i>), listed Jan. 2008
Lower Columbia River chinook (<i>Oncorhynchus tshawytscha</i>), listed June 2005	Purple-lipped Juga (<i>Juga hemphilli maupinensis</i>), listed Jan. 2008
Columbia River bull trout (<i>Salvelinus confluentus</i>), listed June 1998	Dalles Juga (<i>Juga hemphilli dallesensis</i>), listed Dec. 2011
Middle Columbia River steelhead (<i>Oncorhynchus mykiss</i>), listed Jan. 2006	Scott's Apatanian Caddisfly (<i>Allomyia scotti</i>), listed Jan. 2008
Upper Willamette River chinook (<i>Oncorhynchus tshawytscha</i>), listed June 2005	Caddisfly (<i>Namamyia plutonis</i>), listed Dec. 2011
Lower Columbia River coho (<i>Oncorhynchus kisutch</i>), listed June 2005	

Past land management activities have had impacts on watersheds throughout the Forest, but natural conditions and processes, such as erodibility of soils, floods, fire and windstorms also have contributed to current conditions. Management activities that have had negative impacts on fish include road building, timber harvest, water diversions, hydroelectric development, grazing and recreation. More specifically, roads have the potential to influence the health and distribution of aquatic species in several ways. Roads that are in close proximity to stream channels and adjacent riparian areas, natural stream processes may be altered. These processes include wood and sediment routing. Road alignment and fills can isolate floodplains, constrain the channel, alter channel migration, and simplify riparian and aquatic habitat. Construction, maintenance and use of roads can lead to elevated sediment delivery to stream channels, increased human activities that can disturb aquatic ecosystem function, block efficient passage of aquatic organisms, and elevate the risk of chemical contaminants being delivered to aquatic systems.

In prior sections of this report it has been discussed and data shown to highlight all of the past work that has been done to minimize those road-related effects to aquatic, fisheries, and watershed resources. Most of the work addressed road closures and decommissioning. Work also has been completed to minimize effects specifically to fisheries, particularly barriers to fish passage.

Some culverts at road and stream intersections restrict the passage of fish. The MTH conducted an inspection of 621 road crossings across the forest to evaluate whether fish passage was potentially impeded. Of those crossings, 300 were surveyed using the Forest Service Region 6 protocol for assessing barriers to fish passage. The other 321 crossings were either bridges, sites where culverts had been removed, over non fish bearing streams, over intermittent streams, or were in drainage ditches. Eighty five percent of the surveyed culverts were determined to be a likely barrier and impassible to fish, 12 percent were rated as being a possible barrier and need further evaluation, and 3 percent were concluded

to not be a barrier (Appendix 3). The amount of habitat blocked to fish above the culverts identified as being either likely or possible barriers was estimated to be about 175 miles. Cutthroat trout were most affected by culvert barriers (61% of their habitat blocked), followed by redband trout, resident coastal rainbow trout, and Lower Columbia River steelhead. The miles of anadromous fish habitat blocked were a relatively small amount – only 9 percent of their total habitat.

Culvert barriers identified for removal or replacement were prioritized based upon a several factors such as: 1) the amount of habitat blocked, 2) fish species present, and 3) dependence on downstream projects to provide fish passage. Based on this priority ranking, the highest priority culverts were identified (Table 26) that merit consideration for replacement or removal. The 2003 Roads Analysis documented the following high priority culverts with the greatest aquatic risk.

Since 2003, significant progress has occurred in remedying these fish passage barriers. Of the 17 high priority culverts listed above, all but 6 have been replaced (priority 4, 9, 10, 13a, 13b, and 14) to current fish passage standards. Additionally, many culverts that were barriers, but not on the top priority list have been replaced as opportunities arose through other project work.

Future restoration pursuits continue to be culverts that are barriers to aquatic organisms, which will be pursued as projects are planned and implemented and funding is made available. Priority watersheds identified in the WCF will be a focus, as will projects where funding mechanisms such as retained receipts and partnerships grants could be fiscal sources. Roads with a high composite aquatic risk score and a low access need are the distinct opportunities. But roads with high aquatic risk and high access need are also opportunities.

Table 26 – Threatened and Sensitive Aquatic Species on the MTH.

Priority Rating	Stream	Road	Miles of Habitat Blocked	Species/Stock
1	Tag Ck.	4600-267	0.8	Clackamas late run coho
2	North Fork Mill Ck.	1711-630	1.0	Mill Ck. winter steelhead
3	Red Hill Ck.	18	0.5	Hood River summer steelhead
4	Marco Ck.	18	0.6	Hood River steelhead
5	McGee Ck.	1810	0.4	Hood River steelhead
6	Mag Ck.	46	0.7	Clackamas River late run coho
7a	Little Zigzag River	2639	0.7	Sandy River winter steelhead
7b	Little Zigzag River	2639	0.2	Sandy River winter steelhead
8	Dutch Ck.	70	0.5	Clackamas River winter steelhead
9	Whale Ck.	4620	0.3	Clackamas River early run coho
10	Tony Ck.	18	2.5	Hood River winter steelhead
11a	Robinhood Ck.	3520-650	1.0	Hood River winter steelhead
11b	Robinhood Ck.	3520	0.3	Hood River winter steelhead
12	Meadows Ck.	3500-681	0.8	Hood River winter steelhead
13a	Laurel Ck.	1300-620	0.5	Hood River winter steelhead
13b	Laurel Ck.	1350	0.5	Hood River winter steelhead
14	Pocket Ck.	3540	0.5	Hood River winter steelhead

Water Uses

Many people use water from the Forest for various purposes including drinking and irrigation. Municipal water providers supply high quality drinking water to their customers. Without high quality water at intakes, water treatment costs would become very expensive for water suppliers and ratepayers.

Municipal watersheds located on or partially on the MTH include:

- Alder Creek
- Bull Run
- Clackamas River
- Crystal Springs
- Dog River
- Fifteen Mile Creek
- Gordon Creek
- Henry Creek
- Mill Creek

In the LRMP watersheds that are sources for municipal water supply are identified, along with other important watersheds, as being a unique land allocation named Special Emphasis Watersheds. Special Emphasis Watersheds were delineated in the LRMP for the municipal watersheds of the cities of Sandy, The Dalles, Dufur, and Corbett. The city of Portland's source water in the Bull Run has an exclusive designation and its surrounding buffers demarcate an administrative boundary beyond the watershed divide. It is co-managed by the MTH and the Water Bureau through a congressional special agreement. Water quality protection for these cities is also identified in the NWFP as the Tier 2 Key Watershed designation.

The 1996 amendments to the Safe Drinking Water Act (Section 1453) required States to develop and implement source water assessment (SWA) plans which delineate the boundaries of the surface and groundwater source areas that supply drinking water to public systems. The SWA assessment plans for the various public water systems receiving water from the Forest are available on the Drinking Water page of the Oregon Department of Environmental Quality's website:

<http://www.deq.state.or.us/wq/dwp/results.htm>. SWA plans are available for the following public water systems on the Forest:

Clackamas River: Clackamas River Water, Lake Oswego, North Clackamas County Water Commission, Oregon City, City of Estacada and the Forest Service Timber Lake Job Corps Center.

Sandy River: City of Sandy (Alder Creek), City of Corbett (Gordon Creek), and the City of Portland (Bull Run River).

SWA plans for the City of the Dalles (Dog River, Mill Creek), and the Rhododendron Summer Home (Henry Creek, tributary to Zigzag River) are also completed. As an example of the extent of a SWA, the SWA for the City of Estacada (PWS # 4100279) totals about 673 square miles, and extends approximately 33 miles up the Clackamas River into the Collawash watershed.

Not counting the Clackamas River and Collawash, there have been almost 400 miles of road either closed or decommissioned in watersheds that serve as sources of municipal water. In the Bull Run alone about 136 miles of roads were decommissioned, and its entire area is closed to general public use. The majority of road segments that had been rated as being a high risk to aquatic resources and are located in a municipal watershed have been reconstructed, closed, or decommissioned. There remain a few high risk segments of road in these watersheds. They are primarily long-term arterial roads that cross over or are parallel and close to a stream reach. Where the road segment or its drainage structures have deteriorated, there exists deferred maintenance to pursue.

Wildlife

The Mt. Hood National Forest (the Forest) is considered an urban forest due to its location in relation to the Portland metropolitan area. This location results in a high level of interaction between people and wildlife. Highway 26 is heavily traveled at all times of the year. In addition, a large number of recreation sites, including five ski areas, numerous lakes, the Pacific Crest Trail, and Mt. Hood itself, draw people from the local area as well as out of state to visit the Forest. This level of use by people results in a variety of impacts on wildlife populations and behavior.

Roads are one of the primary points of wildlife interactions with humans. Some animals are hit by vehicles and some species reduce their use near roads making suitable habitat less effective due to the disturbance by visitors. Wildlife reproduction near roads may be reduced due to disturbance, however in some cases wildlife can become habituated to traffic. Roads can provide a pathway for non-native species both plant and animal. This can affect habitat and introduce predation and disease from feral sources. Roads also provide access to remote areas for legal hunters, wildlife viewing and poachers.

Forest roads also have a place in allowing administrative access for wildlife management as well as consumptive and wildlife appreciation for those less able to travel long distances on foot. By closing roads, the Forest may be able to increase the available habitat for wildlife utilization but the public will be less able to enjoy that resource. The Forest has implemented many strategies to reduce the impact of roads on wildlife. Some of those strategies included road closures and decommissioning.

The Forest road network can significantly alter wildlife habitats and negatively impact wildlife populations. The *negative* effects of roads on wildlife (including listed and sensitive species) can be classified into six general categories:

- The use and maintenance of the road system can cause disturbance to wildlife activities such as breeding, feeding, resting or dispersal activities.
- Roads create habitat fragmentation and an edge effect which can also disrupt wildlife activities.
- Roads can impede species movement by acting as a barrier.
- Roads can result in direct mortality by impact with vehicles.
- Roads can allow for the introduction of invasive or non-native species, both plant and animal, that kills wildlife, replace native habitat or compete with native wildlife.
- As a result of improve access, roads allow for the introduction of disease from pets, hitch-hiking species or humans due to improved access.

There are three primary *benefits* of roads: 1) wildlife management; 2) consumptive wildlife/hunting; and 3) wildlife viewing. Roads allow biologists to access areas for wildlife monitoring and management. Wildlife management is often easier if there is access to the location of species and their habitats. Roads also assist the public to get to hunting opportunities. Hunting is improved for much of the older population who cannot walk into remote locations or retrieve their animals without vehicle access. Roads also provide the public the opportunity for wildlife viewing and photography. These experiences are improved if there is vehicle access to nature watch sites. There is a positive benefit to the local economy and to contribution of funds for wildlife management from the sale of hunting licenses and sporting equipment that has benefits to managing wildlife in the state

Results of the 2003 RA have been found to still be useful, and so they were used to inform the TAP. The methodology of the RA to evaluate the potential risk of road-related impacts upon wildlife employed a scoring and ranking process to assess individual road segments (Appendix 5). The method was a science-based means for objectively evaluating the entire road network across the Forest at a rather fine scale. A series of subfactors were elements in the scoring methodology. They were the principle elements that when combined, provided a composite rank of the overall risk of a road to wildlife habitat. These subfactors, some of which can be considered static while others would be less so, included individual analyses of:

- Spotted owl nesting, roosting, and foraging habitat
- Bald eagle nesting
- Unique habitats (meadows, talus, caves)
- Late-successional reserves
- Deer and elk winter range
- Wolverine denning habitat

Combined together, the scoring that resulted from the individual analyses of the subfactors computed into the composite aquatic risk rating. Table 27 shows the breakdown of the composite wildlife risk ratings applied across the miles of system roads currently on the Forest.

Table 27 – Percent Miles of System Road by Composite Wildlife Risk Rating

Composite Wildlife Risk Rating	Percent Miles of Current System Roads
Low	35
Moderate Low	38
Moderate	18
Moderate High	4
High	1

Roads that were rated as having a moderate high to high risk were mostly ML 1-3. All were rated as having a low access need. Forty eight percent of those particular miles of system road have been closed to motorized use.

Changed Conditions - In 2003, it was believed that there may be a resident population of wolverine in the Oregon Cascades and on the Forest. An analysis by Aubrey et al. (2007) concluded that “wolverine records in eastern Washington and Oregon during that time probably represent dispersals from Canada or Montana that failed to establish resident populations. It is unclear why wolverines began appearing in previously unoccupied areas during this time period, but we agree with Verts and Carraway (1998) that these records probably represent extreme dispersal events that were not representative of self-sustaining populations.” The Forest has worked in partnership with Cascadia Wild since 2000 to try to locate wolverine on the Forest. Snow tracking and placing remote cameras in order to determine wolverine presence on the Forest has had negative results for the past 15 years. Therefore, it has been concluded that wolverines are not present on the Forest and they will not be given management consideration in the future.

The Oregon spotted frog was listed as threatened by the US Fish and Wildlife Service on August 29, 2014. There is one known population on the Mt Hood National Forest at Camas Prairie. This is the only location for the Oregon spotted frog found on the Forest after over 15 years of meadow/wetland surveys conducted by Northwest Ecological Research Institute in partnership with the Mt Hood National Forest. Roads 2120, 2130, and 2131 as well as the spurs branching off from these roads have a potential to impact the species.

Due to a great deal of work on decommissioning roads in the past five years, the road system is closer to meeting the objectives of open road density for deer and elk management that was outlined in the Forest Plan. The Forest Plan standards call for an open road density of 2.0 miles per square mile within inventoried deer and elk winter range and 2.5 miles per square mile in summer range. In deer and elk winter range (B10) and summer range (B11) land use allocations, the road standard is 1.5 miles of open road per square mile. Figures 6-11 below show how the efforts on the Forest to reduce open road density have made a difference in many watersheds and the impact of roads on deer and elk is improving.

In 2012, the U.S. Fish and Wildlife Service (USFWS) designated critical habitat that was a larger portion of the Forest than the designation in 2008. The 2008 critical habitat included 378,230 acres on the Mt Hood. The new critical habitat designation in 2012 included 521,164 acres on the Forest. This was an increase of 142,934 acres or a twenty-seven percent increase in area of critical habitat. Existing roads have no impact on critical habitat for spotted owls.

Northern Spotted Owl - Spotted owls tend to nest away from an opening. The mean distance found by Janice Reed (personal communication 2007) in the Tyee study was 287 +/- 19 meters. Only 2.5 percent of the nest sites were within 100 feet of an edge. The mean distance she found for nest in relation to roads was 224 meters (Reed, J. personal communication 2007). Buchanan found that eleven (of 85) (13%) nest trees were less than 200 feet from a gravel or dirt logging roads and seven trees were less than 100 feet of hiking trails. This did not differ significantly from mean distances to openings at random sites (Buchanan, J. 1991).

Kerns et al. (1992) research indicated thirty-five nest trees were examined in relation to 15 different types of activities. Several of these activities included distance to roads and road use. In three (9%) cases, nest sites were less than 100 feet of a well-used road. These distances were five, 20 and 100 feet, respectively. Each of the nests was successful in producing young (Kerns et al. 1992). The project leader for the Forsman Coast Ranges project (2003) indicated that it is unusual for owls to nest in trees along major traffic roads. However, the project leader is aware of at least two examples where owls did nest along a major road (Forsman et al. 2003, personal communication).

The indication is that there is a negative correlation with spotted owl nests and the proximity to a road. Therefore, a reduction in the openings associated with roads would have a positive effect on spotted owl nesting.

Oregon Spotted Frog - This declining species is associated with wet meadows. The only known location on the Forest for the Oregon spotted frog is at Camas Prairie on the Barlow Ranger District. There were extensive amphibian surveys for over fifteen years in the appropriate habitat without discovering any new locations for Oregon spotted frog. The Forest has determined that there are no locations within the boundaries where the spotted frogs occur. The prairie is surrounded by roads, but at a distance that should not pose a threat to the Oregon spotted frog. Roads can introduce opportunities for chemicals to be transported into the aquatic system. A variety of threats can be created by the juxtaposition of a road and aquatic habitat. Fuel leaks or spills, deicing, automotive chemicals such as battery acid, oil, transmission lubricant, ethylene glycol or anything being transported inside the vehicle has opportunities for infiltration into the system through leaks, spills, and accidents.

Most chemicals coming from a point source are more likely to move vertically in the soil than to move horizontally. When chloride levels from salted roads were monitored in the aquatic system the research showed that the chloride was more likely to move vertically rather than horizontally. Horizontal movement dropped to approximately 25% at six meters and was unmeasurable at 16 meters (Lax, S. and E.W. Peterson. 2009). Vegetation can slow the infiltration of chemicals into the aquatic system. In non-event scenarios the buffer of vegetation between the current roads and the Oregon spotted frog habitat should significantly prevent any affects to the frogs. However, if a large spill should occur on a segment of road upstream of Camas Prairie this could have a negative effect on the amphibian population in the meadow.

Since the Oregon spotted frog was not yet listed, it was not a consideration in the 2003 RA. During the Change Condition Analysis there were no recommendations by District wildlife biologist to change roads maintenance levels as a result of listing the Oregon spotted frog. The Oregon spotted frog critical habitat rule has not been finalized at this time.

Wolverine and Sierra Nevada Red Fox - Wolverines and Sierra Nevada red fox share similar habitat preferences. These two species inhabit alpine habitat primarily above 4,000 feet. Both also have very low populations in the habitats they occupy. They both avoid human contact in most instances although some fox can become habituated to humans and even become dependent on them for food scraps.

The wolverine is a solitary animal and will abandon a den site and move the young if disturbed by human presence. Therefore, any road that comes within hiking, snowshoeing, or skiing distance of the den would make that habitat unusable by wolverines for denning purposes. In addition, snowmobile access can be a major impact on denning by this species. This is one animal that needs solitude and little human intrusion to their denning areas and will not travel through areas where they perceive that people will be present. Roads can be a major barrier to movement of these animals as well as transporting people into its habitat.

Roads can bring people and their pets in close contact with both species and this provides an opportunity for the introduction of disease. Due to their low population levels, the loss of only a few animals can cause problems for the population. Wolverines are not believed to be residents in the Oregon Cascades and may only be occasional transients on the Forest.

Bald Eagles - Currently there are two known bald eagle nesting sites on the Forest. However, additional habitat was identified as potential nesting areas for bald eagles during the Forest Plan development process. Bald eagles are sensitive to disturbance. A one-mile distance will be used to rate potential bald eagle disturbance. However, the eagles are not always aware of this parameter and choose to nest close to sites with high human traffic.

Peregrine Falcons - There are two known peregrine falcon nest locations on the Forest. One is located on a major travel route and the other is on a road that has been scheduled for decommissioning. The arterial route that passes the one site could not be closed for practical reasons the second site on the Forest is planned for decommissioning. Therefore, there is no rating system developed for peregrine falcons.

Harlequin Ducks - Harlequin ducks nest along river edges. They can be impacted by fisherman, hikers, rafting and kayak use. The impacts to the river resource by roads are similar to the impacts to fish. Because there is such a great emphasis on protecting the aquatic system for salmonids, the measure incorporated to reduce roads to protect this resource will benefit harlequin ducks. Therefore, no rating system was developed for this species.

Western Bumblebee, Johnson's Hairstreak Butterfly, and Mardon Skipper - These three insects can occupy habitat adjacent to roads. Mardon skippers have not been found on the Forest despite several years of surveys by both the Forest Service and the Xerces Society. The main impact to the bumblebee and butterfly would be the occasional impact by vehicles. Johnson's hairstreak butterflies are in sufficient numbers that the loss of an occasional individual would not be detrimental to the population. The western bumblebee population however is declining. The loss of a queen during the early part of the summer could be an impact to the local population. At

the beginning of the season the local population will consist of just a few queens that have to lay eggs to start the production of workers and future queens. However, vehicle collisions are not thought to be as great of a threat as disease to the population. Because this bee is often found in meadow habitat, the best recommendation is to decommission roads that cross meadow habitat when possible. During the Change Condition Analysis there were no recommendations by District wildlife biologist to change roads maintenance levels as a result of western bumblebees or any other insects.

Sensitive Species - The Regional Forester's sensitive species list is updated periodically. The list that was current in 2003 has changed and we are currently using a list that was updated in 2011. This list is currently in the process of being updated, and therefore, the following analysis includes the 2015 list even though it has not yet been finalized. The table below shows the degree of impact a road could make on an individual that may contribute to declines in the population brought about by disturbance, reproduction or mortality from vehicle collisions. The level of impact is related to the effect on the individual of a species not the impact to the population. For example even though the effect on a pair of bald eagles may be high for that individual it may have no effect on the population.

Table 28 – Qualitative Effects of Roads Expected on Regional Forester's Sensitive Species

Common Name	Scientific Name	Expected Level of Impact by Roads
Bufflehead	<i>Bucephala albeola</i>	Low
American peregrine falcon	<i>Falco peregrinus anatum</i>	Low- High ¹
Bald eagle	<i>Haliaeetus leucocephalus</i>	Low-High ¹
Harlequin duck	<i>Histrionicus histrionicus</i>	Medium
Lewis' woodpecker	<i>Melanerpes lewis</i>	Low
White-headed woodpecker	<i>Picoides albolarvatus</i>	Low
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Low
Wolverine	<i>Gulo gulo</i>	High
Fringed myotis	<i>Myotis thysanodes</i>	Low
Sierra Nevada red fox	<i>Vulpes vulpes necator</i>	Low-Medium
Puget oregonian	<i>Cryptomastix devia</i>	Low
Columbia Gorge oregonian	<i>Cryptomastix hendersoni</i>	Low
Columbia sideband	<i>Monadenia fidelis columbiana</i>	Low
Dalles sideband	<i>Monadenia fidelis minor</i>	Low
Crater lake tightcoil	<i>Pristiloma crateris</i>	Low
Broadwhorl tightcoil	<i>Pristiloma johnsoni</i>	Low

Crowned tightcoil	<i>Pristiloma pilsbryi</i>	Low
Shiny tightcoil	<i>Pristiloma wascoense</i>	Low
Pristine springsnail	<i>Pristinicola hemphilli</i>	Low
Western bumblebee	<i>Bombus occidentalis</i>	Medium
Johnson's hairstreak	<i>Callophrys johnsoni</i>	Medium
Mardon skipper	<i>Polites mardon</i>	Medium
Beller's ground beetle	<i>Agonum belleri</i>	Low

¹. The effect of a road on some individuals may be high and yet others of the same species may habituate to roads, traffic, and humans.

Survey and Manage Species - In 1994, the Bureau of Land Management and the Forest Service adopted standards and guidelines for the management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl, commonly known as the Northwest Forest Plan. Mitigation measures were included for management of known sites, site-specific pre-habitat disturbance surveys, and/or landscape scale surveys for about 400 rare and/or isolated species. These are species that, either because of genuine rarity or because of a lack of information about them, the agencies did not know whether they would adequately be protected by other elements of the Northwest Forest Plan, therefore they were incorporated into a special category under that plan.

The following eight species are terrestrial wildlife species that are documented on the Forest. The table below shows the degree of impact a road could make on an individual that may contribute to declines in the population brought about by either disturbance or reproduction or mortality from vehicle collisions.

The impact of roads on survey and manage species is low for several reasons. The mollusks on the sensitive list are tied to very tight habitat preferences that are not affected by the presence of the road. They are not highly mobile and do not travel long distances over non-habitat so they are unlikely to be run over by vehicles. The road itself can act as a barrier to movement and may slow or could possibly deter movement creating population fragmentation and interfere with gene flow. Red tree voles are arboreal and rarely come to the ground. Larch Mountain Salamanders spend very little time traveling above ground and prefer to stay hidden in talus, staying under bark or the forest duff. They are very rarely found on roads. Great gray owls have nested in close proximity to roads and do not seem to be disturbed by vehicle traffic. Therefore, no rating system is designed to rank road impacts to these species.

Table 29 – Relative Effects of Roads Expected on Regional Forester's Sensitive Species

Common Name	Scientific Name	Level of Impact by Roads
Puget oregonian	<i>Cryptomastix devia</i>	Low
Columbia Gorge oregonian	<i>Cryptomastix hendersoni</i>	Low
Dalles sideband	<i>Monadenia fidelis minor</i>	Low
Crater lake tightcoil	<i>Pristiloma crateris</i>	Low
Arborimus longicaudus	Red Tree vole	Low

Plethodon larselli	Larch Mountain salamander	Low
Strix nebulosa	Great gray owl	Low

Management Indicator Species - The National Forest Management Act (NFMA 197X) requires the Forest Service to manage wildlife habitat to maintain viable populations of existing native and desired non-native vertebrate species on the Forest. Because it is difficult to monitor all species at the same time, NFMA requires the Forest Service to identify Management Indicator Species (MIS) through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. The primary assumption of this process is that indicator species represent the habitat needs of other species that have similar habitat requirements. Spotted owls, for example, indicate the needs of a variety of species that use old growth forest (FEIS Mt. Hood Land and Resource Management Plan, Page III- 55).

Table 30 indicates the degree that roads could impact individuals of a species. The impact could be from disturbance or from direct mortality by impact by cars.

Table 30 – Relative Effects of Roads Expected on LRMP Management Indicator Species

MIS	Habitat Description	Relative Effect on Species
Northern Spotted Owl	Old Growth	Medium
Deer	Early Forest Succession and Mature/Old Growth	High
Elk	Early Forest Succession and Mature/Old Growth	High
Pileated Woodpecker	Mature/Over-Mature	Low
American Marten	Mature/Over-Mature	Medium
Salmonids	Aquatic (see Fisheries Forest-wide analysis)	See Fisheries Analysis
Western Gray Squirrel	Pine-Oak	Medium
Wild Turkey	Pine-Oak	Medium

The rating system was developed for deer and elk, and no other MIS species, because they are subject to high impacts from roads. In environments where deer and elk are hunted they learn to avoid roads. The avoidance of roads causes a reduction in the use of early seral habitat. When roads occur in winter range or important summer range disturbance from vehicles can cause them to expend energy that could be critical to winter survival. This type of effect is not experienced by other MIS species.

Deer and Elk Winter Range - The effect of roads on deer and elk use of habitat is well documented. Numerous studies have shown that elk will reduce the use of habitat near roads where vehicle traffic is present. Deer are less sensitive. Even on low use roads, once an animal has been disturbed at that location they will reduce using the habitat near the road. The effect is that for about 300 feet on either side of the road there is a large reduction in use of that habitat. During the summer this can reduce the area that animals use, but it is not as critical as during the winter when the only available forage that is not under snow is concentrated into narrow bands at the lower elevations. Deer and elk typically spend most of their time within a one to two square mile area during any one season so limiting the forage can be a serious detriment to the nutrition of the herd.

The Forest Plan has standards that limit road density. The maximum is 2.0 miles per square mile within inventoried deer and elk winter range. In the 2003 Roads Analysis the focus was strictly on winter range since that was considered the most limiting factor for large ungulate survival. However, in recent years the role of summer range has surfaced as important to fat storage that improves animal survival over the winter.

The Forest Plan standards indicate that summer range road densities should be below 2.5 miles per square mile. The Forest Plan also made two special allocations for deer and elk summer and winter range that were designated B11 and B10 respectively. These were areas that were identified by biologists during that time that had a high use from deer and elk. These allocations were given a higher standard for road density of 1.5 miles per square mile as a maximum. The biologists anticipated using road closure as a method for improving habitat for deer and elk.

Since 2003, when the last roads analysis took place, there has been a tremendous effort to reduce roads. This effort was driven by maintenance cost, watershed improvement goals, fisheries improvement and wildlife habitat considerations. Figures 6-9 show the change in road densities as a result of efforts to reduce roads in relation to the Forest Plan standards for summer and winter ranges. Figures 10 and 11 show the change in road density between 2003 and 2015 compared to the Forest Plan land use allocations B10 and B11.

Figure 6 – Road Density in Deer and Elk Winter Range in 2003

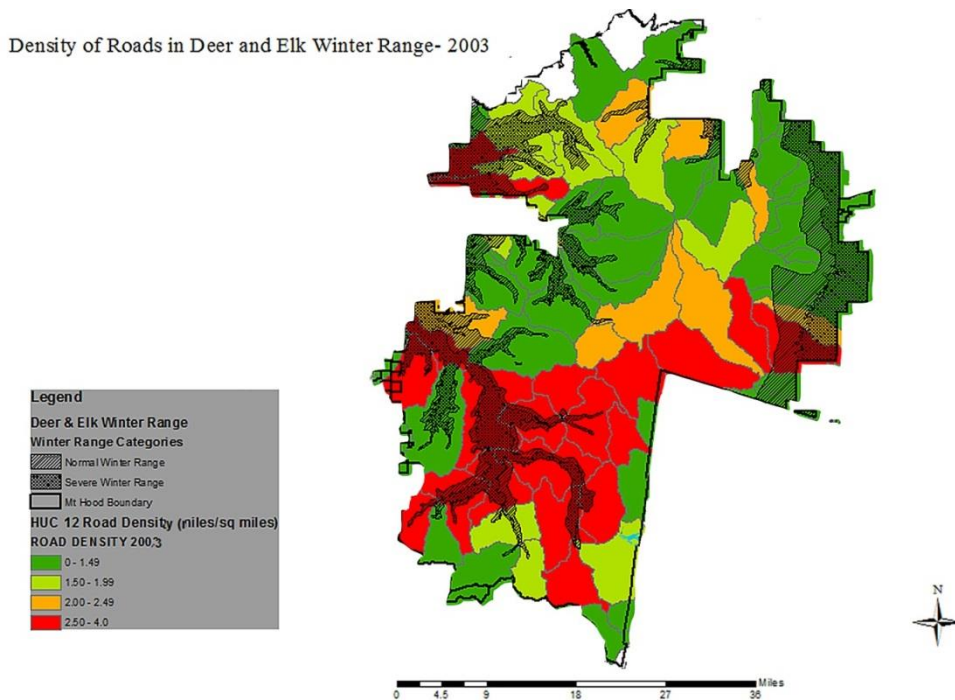


Figure 7 – Road Density in Deer and Elk Winter Range in 2015

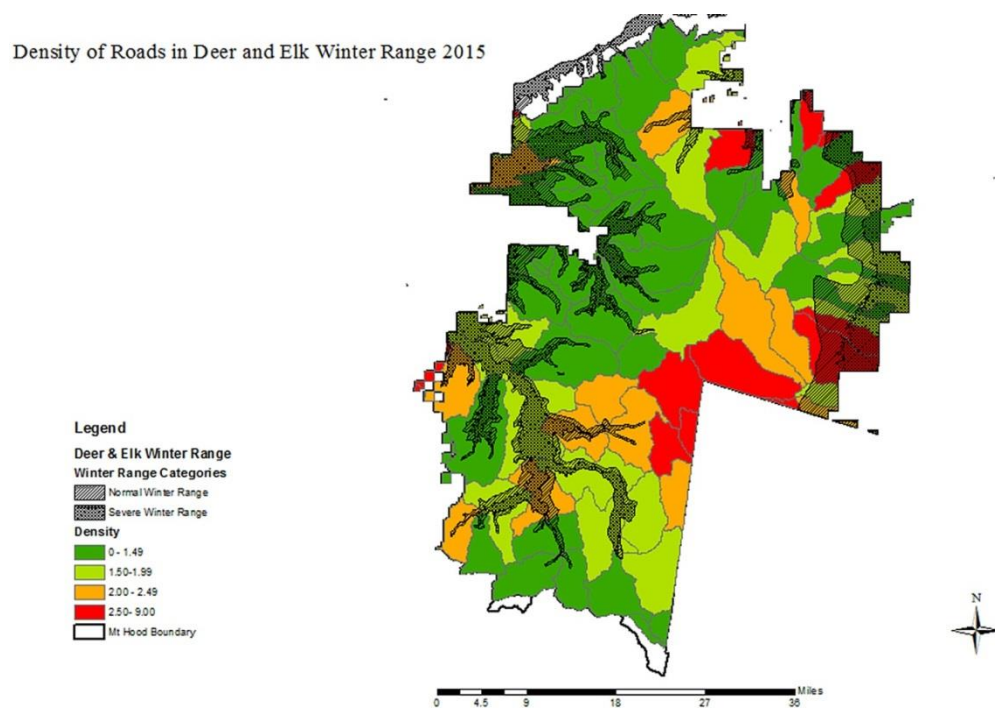


Figure 8 – Road Density in Deer and Elk Summer Range in 2003

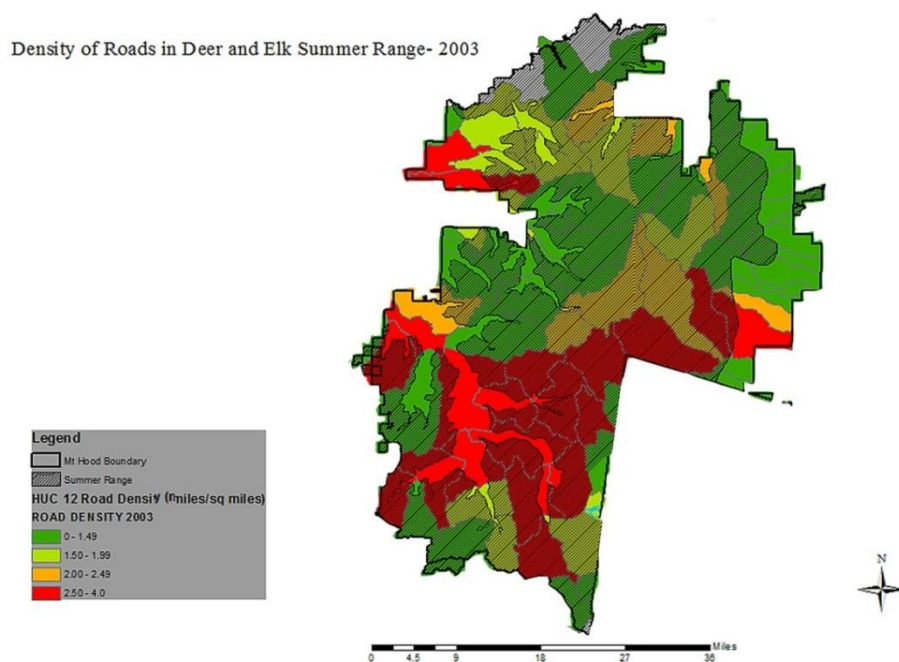


Figure 9 – Road Density in Deer and Elk Summer Range in 2015

Density of Roads in Deer and Elk Summer Range 2015

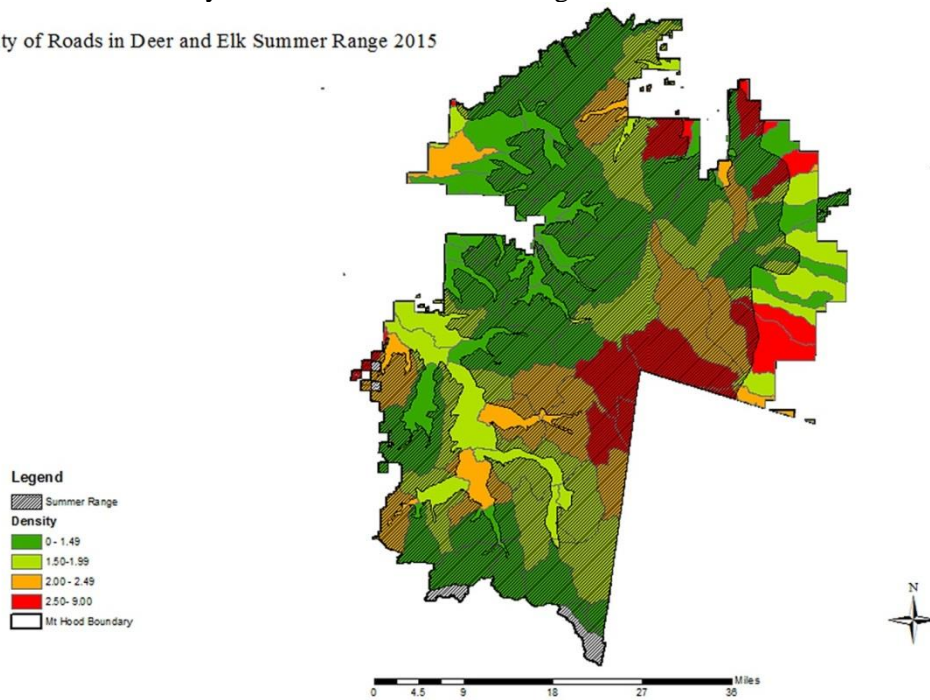


Figure 10 – Road Density in B10 and B11 Summer and Winter Range in 2003

Density of Roads in Land Allocations B10 & B11- 2003

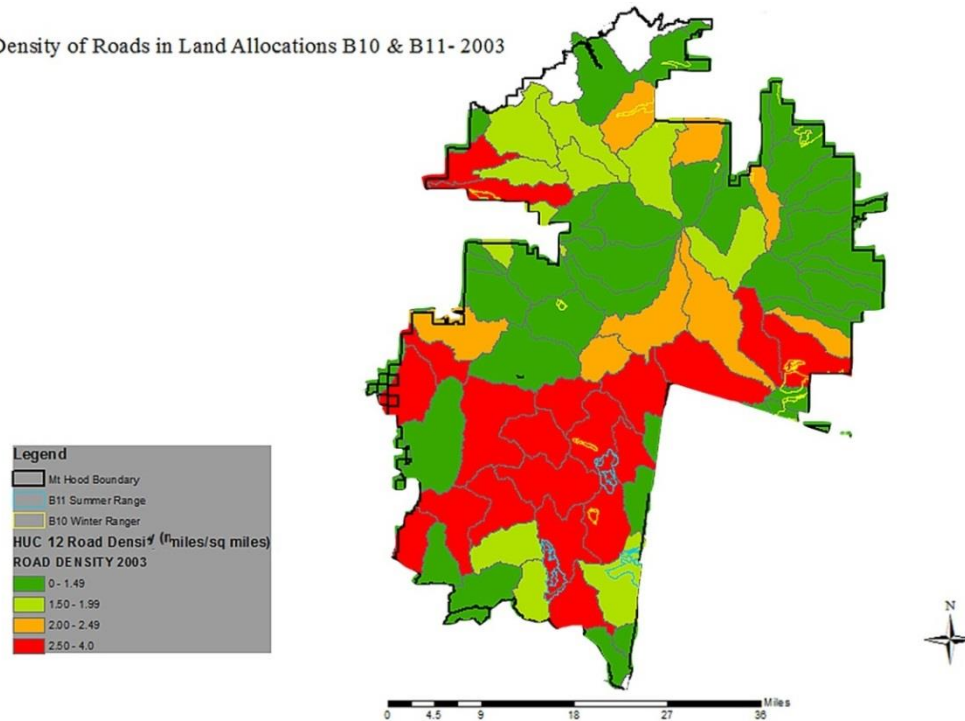
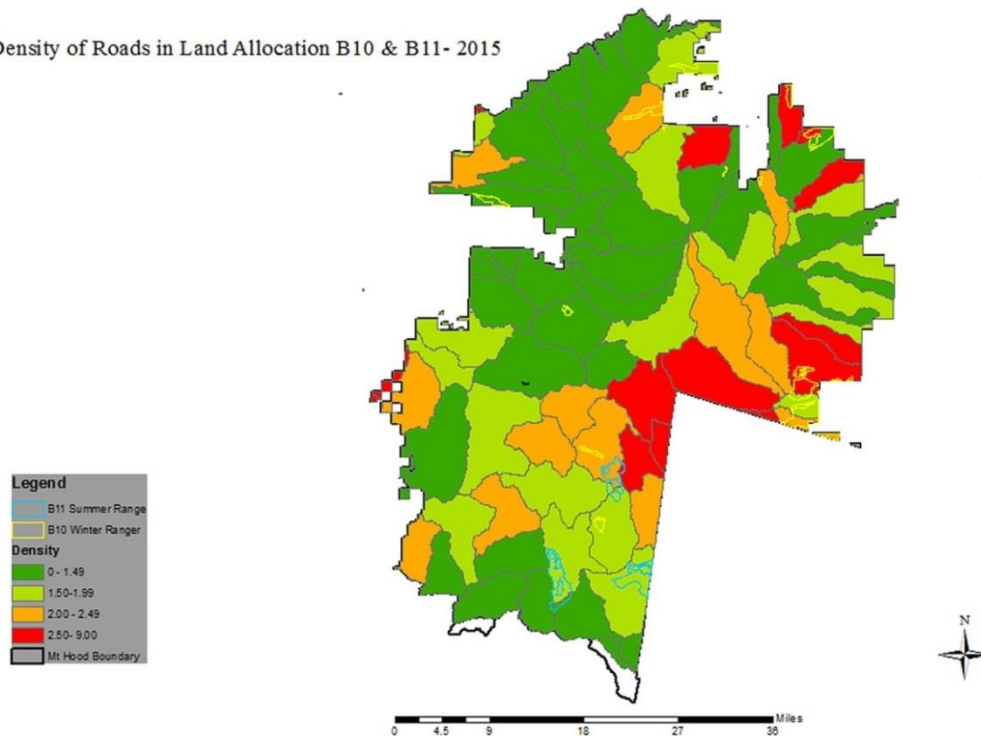


Figure 11 – Road Density in B10 and B11 Summer and Winter Range in 2015

Density of Roads in Land Allocation B10 & B11- 2015



Unique Habitats – Meadows, talus, and caves are unique wildlife habitats that are limited in area and distribution. These terrain features are often important habitat for unique species and are important to the lifecycle for some species. Some species of bats may only use caves and mines for roosting and maternity colonies. Some species of frogs may only use particular meadows with unique micro characteristics. Talus is the only place where pika can live and the rare Larch Mountain salamander is closely associated with talus slopes.

Roads in these habitats can alter the hydrology, and bring predators or harassment to the creatures using these habitats. A road to a mine or cave may provide access to exploration that may disturb bats roosting there. Disturbance of bats at critical parts of their life can cause them to expend energy and die.

Botanical Resources

In the 2003 RA a coarse evaluation of the where road related risks associated with botanical concerns might be located. The methodology relied upon knowledge of where roads were within 100 feet of special status species or non-native invasive plants populations. A scoring schema was applied so that the relative risk of individual road segments could be mapped ([Appendix 5](#)). The mapping is still considered useful as basic information to inform project-level planning, but since 2003 there have been some changed conditions that could necessitate another look at the proximity of certain plants to a road segment and what that may mean relative to long-term management of the transportation network. Changed conditions that were evaluated relative to botanicals included:

- New special status species added to a list
- New critical habitat designation
- New presence of a listed special status species
- Expanded population of existing special status species

- New non-native invasive species detection
- Expanded population of existing non-native invasive species

Results of the changed conditions evaluation indicated that some new populations have been identified or expanded. Since 2003, the miles of new road constructed has been very small, and entailed primarily re-routes. In contrast there have been many hundreds of miles closed or decommissioned, which has been considered a benefit to some special status species located there. In general, the last two decades of reducing the open road system has favored special status plants.

Non-native invasive plants have spread somewhat since 2003, even on some closed and decommissioned roads. But for the most part, their spread has continued to be along primary arterials and facilitated by human or natural disturbance or natural dispersal. Populations have grown denser along many road segments where they existed. There have also been several new species detected since 2003 which continue to prove difficult to impede and have encroached along existing arterial road corridors, many of which have long been infested with other invasive species.

Upon review by the zone botanists, it was concluded that these changed conditions do not necessitate a change in an access need rating or a resource risk rating that's different than what the 2003 RA determined. Rather, the changed conditions are management concerns that are addressed at the project-level.

Special Status Species - All Forest Service projects, programs, and activities require review and documentation of possible effects on botanical species on the Region 6 Regional Forester Special Status Species List ([USDA 2011](#)). These include federal TEP (threatened, endangered, or proposed) species, species on the Region 6 Regional Forester's Special Status Species List, and strategic species (FSM 2672.4 & 2670.44). ("Strategic" species do not need to be addressed in biological evaluations.) Special-status botanical species include vascular plants, bryophytes, lichens, and fungi. In compliance with these directions and policies a biological evaluation must be performed for all ground- or habitat-disturbing activities on national forest land.

Locations of TES plants found during project evaluations and surveys on the MTH are recorded in its plant database, the Natural Resources Inventory System (NRIS) TES Plants database, and local information such as species habitat and range information. Surveys to detect the presence of botanicals are conducted in and adjacent to proposed project areas but the Forest-wide road system and adjacent road prism has not been completely surveyed.

No federally listed threatened or endangered botanical species or federally proposed botanical species are documented (known) to occur on the MTH. One federally listed threatened species, water howellia (*Howellia aquatilis* var. *aquatilis*), is suspected to occur on the MTH but has never been found. There are, however, about 58 sensitive species documented as occurring and about another 45 sensitive species suspected to occur on the MTH. These include 43 vascular plants, 34 bryophytes, 6 lichens, and 20 fungi, altogether totaling 103 species.

Coldwater corydalis is a Pacific Northwest endemic that grows in or along cold streams. The species occurs on the Gifford Pinchot, Mt. Hood, and Willamette National Forests. The Mt. Hood National Forest is the "epicenter" for the distribution of coldwater corydalis in the Pacific Northwest with extensive populations along the Oak Grove Fork of the Clackamas River and along the Upper Clackamas River.

Road projects and maintenance activities have the potential to cause adverse effects to special status species by altering their habitat or immediate impacts to plant individuals during ground

disturbing activities. Some of these concerns may include the removal of trees adjacent to the road that might provide canopy or microsite habitat for plants, road maintenance activities that might include equipment use within the plant habitat, the loading of excavated road waste material on the plant site, the destruction of rocky habitat during blasting for rock pits, the loss of stream connectivity where culverts have rerouted streams and altered hydrology, and the accidental introduction of noxious weeds to the habitat via equipment use and soil exposure.

Future road management will continue to require site-specific analysis with regard to conserving special status species.

Non-Native Plants - Roadside areas throughout the nation frequently support an abundance of non-native invasive plants (weeds). Weed abundance in these areas is often attributed to three factors:

- Level of initial disturbance from road construction resulting in extensive areas of mineral soil and exposed parent material that provide ideal sites for weed colonization;
- Frequent disturbance regimes as a result of regular road maintenance and use that provide opportunity for additional weed colonization and expansion of established populations; and
- Vehicles traveling the roads and other human activities along road corridors often transport weed seed or propagules into the area.

Roadside areas of the Mt. Hood National Forest system roads currently support substantial populations of non-native invasive plants. Weed surveys conducted as part of ongoing weed inventory since 2008 have found that as much as 80 percent of the roadsides surveyed support some level of weed infestation.

On the east side of the Forest, the noxious weed species of concern include *Centaurea maculosa* (spotted knapweed), *Centaurea diffusa* (diffuse knapweed), *Centaurea pratense* (meadow knapweed), *Centaurea repens* (Russian knapweed), *Hieracium aurantiacum* (orange hawkweed), *Hieracium pratense* (meadow hawkweed), *Senecio jacobaea* (tansy ragwort), *Cyanoglossum officinale* (houndstongue), and *Linaria vulgaris* (yellow toadflax).

On the Barlow and Hood River Ranger Districts, many arterial and collector roads have large noxious weed infestations, as do some of the spurs leading into these roads. Noxious weeds adjacent to wilderness areas are of particular concern. The following roads on the Barlow Ranger District have populations of noxious weeds of concern: 17 (Barlow R.D. side), 1720, 1722, 44, 4420, 4421, 4430, 4440, 4450, 4460, 27, 2710, 2711, 2720, 48, 4810, 4811, 4814, 4820, 4830, 4840, 4850, 4860, 4880, 4881, 4890, 4891, 3530, 43 (Barlow R.D. side), 4310, 4330, 2110, 2120, 2130, 2131, 42-220, and Highway 216. The following roads on the Hood River Ranger District have populations of noxious weeds of concern: Highway 35, 18 (Hood River R. D. side), 1810 (at Lolo Pass), 17 (Hood River R.D. side), and 2630.

On the west side of the Forest the noxious weed species of concern include *Centaurea maculosa* (spotted knapweed), *Centaurea diffusa* (diffuse knapweed), *Hieracium aurantiacum* (orange hawkweed), *Hieracium pratense* (meadow hawkweed), and *Polygonum cuspidatum*, *P. polystachyum*, *P. sachalinense* (knotweed). The following are some of the roads on the ZigZag Ranger District that have noxious weeds of concern: Highway 26, 18 (ZigZag R.D. side), 1828, 10 (closest to 18), 2656, and 2612. Other areas with infestations also include the Laurel Hill Pit off of Highway 26 and the private driveways to summer homes along 2612. The following are some of the roads on the Clackamas River Ranger District that have noxious weeds of concern: Highway

224, 45, 4510-130, 46, 4635, 46-330, 4661-026, 4670, 4600 at junction with 4220 (Squirrel Quarry), 57, 5730-160/170, 5732, 58, 58-034, 42, 6350-210, 6330-200, and 7010.

The risk of weed introduction and spread posed by roads is a function of road use and maintenance level, as well as the proximity and biology of individual weed species. Weed species found along forest roadsides generally fall within three categories with different levels of infestation risk and concern.

Category I - Common weed species with short-term occupancy (or frequent disturbance) - These species are found along most roadsides on the Forest and are generally dependent on frequent disturbance, such as road maintenance, for long-term site occupancy. Competition from native vegetation and increased canopy closure will limit the distribution and growth of these weeds. The dispersal mechanism and vector for seed transport of many of these species is wind. However, road traffic, maintenance machinery, and other human uses contribute to seed transport and spread. Some species in this category are listed on the Oregon Department of Agriculture's Noxious Weed List. Examples of plants in this category include tansy ragwort, bull thistle, and common yard weeds like dandelions.

The infestation risks associated with weed species in this category are generally low. Benefits of initiating new management actions to contain or control spread along roads would be minimal.

Category II - Common weed species with potential for long-term site occupancy - These species are found along many roadsides on the Forest (estimate is 50-60% based on inventory work). Once established, they are not dependent on frequent disturbance for long-term site occupancy. Vehicles, heavy equipment, and other human activities (yard waste disposal, animal feed, contaminated seed) have been documented or are suspected as long-range vectors for the spread of many species in this category. These species have potential to disrupt natural successional pathways of forest vegetation. Most species in this category are listed on the Oregon Department of Agriculture's Noxious Weed List. Examples of plants in this category include Scotch broom, Himalayan blackberry, knapweeds, orange and meadow hawkweed.

The infestation risks associated with weed species in this category are high. Initiating management actions to contain established populations and prevent weed spread along roads would be beneficial. The costs associated with treating these species across the state represent a substantial economic impact (ODA 2014), so early detection and prevention efforts are extremely valuable. Implementation of management actions along primary and secondary roads traversing areas of the Forest where these species are not present, such as wilderness areas, would provide the greatest benefits.

Category III - Uncommon weed species with potential for long-term site occupancy - These species are found or suspected in only a few locations on or adjacent to the Forest. Once established, they are not dependent on frequent disturbance for long-term site occupancy. Vehicles, heavy equipment, and other human activities (yard waste disposal, animal feed, contaminated seed) have been documented or are suspected as long-range vectors for spread of many species in this category. These species pose the greatest threat of spread along forest roads, with potential adverse effects to ecosystem function and natural processes. All species in this category are listed on the Oregon Department of Agriculture's Noxious Weed List. Examples of plants in this category include Japanese knotweed, false brome, and garlic mustard.

The risks associated with weed species in this category are very high. Initiating management actions to contain and control established populations and prevent the spread of weeds in this category along roads is critical to maintaining ecosystem function and resource values. Measures

to contain known infestation sites and prevent the spread of weeds in this category have been implemented in all areas where primary and secondary roads traverse known infestation sites. The cost to remove established populations of these invasive plants can also cause a potential economic impact due to the difficult nature of treating these weeds and their ability to spread rapidly (ODA 2014). New infestations and new species that fit this category and further increase risk are anticipated in the future (Steinmaus, 2002).

Most of the weed infestation risk is associated with primary and secondary roads that are regularly maintained for public use and the new construction of “temporary” roads associated with timber harvest activities. Closed roads and roads that are not regularly maintained (storm-proofed and allowed to “grow-in”) pose a relatively low risk of weed infestation to category II and III weeds (Parendes 1997). All road closure projects include weed survey and treatment measures to ensure no populations of these weeds will persist.

The following weed prevention measures for road corridors should be considered and, where applicable, included when planning and implementing work.

Equipment cleaning – Equipment cleaning should apply to all contract, force account, cooperator and special use equipment and would apply to tractors, mowers, graders and other equipment including vehicles and ATVs that have been used off the road surface. Require equipment cleaning for:

- All equipment brought onto the Forest
- All equipment moved from infested areas (category II and III weeds) to uninfested areas
- Equipment moved from anywhere into an uninfested sensitive area (such as wilderness or special interest areas)

Competitive seeding – Seed disturbed sites, including roadsides, which lack canopy cover using native species seed mix. Native, locally-collected seed is preferred according to Forest Service policy, but non-native, non-invasive, certified weed-free seed may be used as an alternative. Consult with Forest botanists and invasive species specialists for the recommended seed mix and seeding window.

Maintain Canopy Cover – Maintain existing canopy cover to the extent possible when designing new roads or marking clearing limits for temporary roads.

Weed-Free Rock Sources – Consider development of a quarry certification program and use only weed-free rock sources for road construction and maintenance.

Close roads – Close Forest roads not needed for the foreseeable future. Gated roads and roads that are storm-proofed and allowed to grow-in are at a much lower risk for weed invasion and transport than maintained roads.

Quarantines – Consider the use of Oregon Department of Agriculture quarantines (ORS 561.510 & 561.540, 2001) if needed for new weed species or plant pathogens.

Inventory and Treatment – Conduct annual weed inventory of the Forest road system and maintain a current GIS weed inventory layer available for use by project planners and implementation personnel. Prioritize treatments to minimize the spread of current invasive species populations.

Internal and External Weed Education – Address weed issues during school presentations and interpretive walks. Provide increased awareness of weed issues and prevention methods within the Forest Service workforce through training sessions and presentations during workforce meetings.

The Forest-wide Noxious Weed map layer (and annual updates to it) should be used in consultation with the District or Zone Botanist and the Forest-wide Range Conservationist during project planning. The Forest Noxious Weed Map layer represents all known noxious weed sites in previously surveyed project areas. Surveys are conducted in and adjacent to proposed project areas by the District Botanists and the Forest Range Conservationist. Additional surveys are conducted annually through a Memorandum of Understanding with the Oregon Department of Agriculture Noxious Weed Control Program along various roads in the forest. The forest-wide road system and adjacent road prism has not been completely surveyed.

Climate Change

Projections of climate change rely on trends that can be observed in the records of certain climatic variables. A number of studies have examined long-term (century-scale) records of climate variables over the North American region. Most of this work has pertained to trend analyses of near-surface air temperature, precipitation, and extreme weather events. Other studies around the globe have also looked at the effects upon sea surface temperature, sea levels, and glacial recession. Atmosphere-ocean general circulation models, known as GCMs, have been used to run scenarios of future climatic conditions based upon some of these trends and effects.

In general, analyses of trends have found daily minimum temperature to be on the rise, and the diurnal range of fluctuation to be decreasing in the Pacific Northwest (Cambridge University Press. 1998). In the western Oregon climatic divisions, precipitation increased by 10-20 percent between 1990 and 1994. Trends in the frequency and magnitude of extreme weather events in some studies have found a weak trend toward higher frequencies of heavy precipitation events, such as in 1-day rainfall intensities and runoff probabilities. On the MTH, 25-year runoff events have been experienced several times in the last 10 years.

While these trends appear to offer some predictability, there is still a lot of uncertainty in how climate change will manifest over the next decade or two. Results of different GCMs that have included the Pacific Northwest region have similarities but also wide differences. Modeled results are also highly variable between regions of North America.

The variation in model results for the Northwest is correlated to the variability of the Pacific Decadal Oscillation, or the timing and magnitude of La Niña and El Niño sea-surface temperature phenomenon. In the Northwest, La Niña events produce higher than normal precipitation in the winter, while El Niño events cause drier winters roughly twice in a decade.

Summarizing here however the variation of the modeled results and what they might suggest about future climate could lead to circuitous discussion about what adaptation could mean regarding a road system for the future. It is suggested here that the outputs most useful for informing what a future road system on the MTH might consider include interpretations of potential changes to forested ecosystems and the hydrologic regime.

Forested Ecosystems – Should the temperature and precipitation trends continue, several responses to forested ecosystems could be anticipated. Potential drought and forest health issues that could ensue are of particular note if shifts in the persistence and strength of El Niño events increase. Then concerns about developing conditions prime for extreme wildfire

could become elevated, and the need for road access to support suppression efforts heightened. Fire seasons could become longer and wildfires more frequent and larger. The east zone of the MTH in the rain-shadow of the Cascades would be especially prone.

Conversely, should trends characteristic of La Niña events prevail, then it's plausible to anticipate an increase in growth and the production of biomass. Such increases could illicit a number of responses in forested land use and forest health, possibly making access needs for vegetation management an elevated re-consideration.

Hydrologic Regime – Should the temperature and precipitation trends continue, several responses to the hydrologic regime could be anticipated. Two noteworthy hydrologic considerations on the MTH stand out regarding roads: 1) more frequent high-intensity rainfall, and 2) an increase in elevation of the transient and persistent snow zones.

Should the effects of El Niño remain a strong influence on trends, then an upward shift in elevation of the transient and persistent snow zone could mean lower runoff, fewer rain-on-snow events, and a decrease in the risk of damage to the road system from winter storms.

Conversely, should trends characteristic of La Niña events prevail, then it's plausible to anticipate heavy precipitation occurrences to possibly be more intense and frequent. Effects to aging road drainage structures could be expected to be greater, particularly to mid-slope and valley bottom roads in steep terrain. Rain-on-snow events, which typically impart the greatest degree of impact on roads in the Northwest, might become more commonplace.

Studies of trends and results of modeling to project shifts in climatic variables is laden with second-guessing when it comes to predictable vulnerabilities and access needs related to the road network. But sensitivity of the road system to shifts in climatic trends would suggest two concerns: 1) that road drainage structures, especially aging ones under steep mid-slope and valley bottom roads are likely most vulnerable (particularly those around Mt. Hood), and 2) a road system that supports fire response could become a principle access need, particularly around WUI.

It should be entered into consideration that, while the qualitative nature of this climate change discussion may lack specificity, the utility of this TAP by the end of the next decade will likely have waned, and another analysis of the road system will be mandated to take its place. By then climate shifts may become more certain relative to access needs and risks of roads to natural resources.

Desired Future Conditions for Natural Resources

Generally the desired future condition is to have a road system that minimizes road-related effects to natural resources. Road-related restoration should continue to focus on reducing effects to aquatic, botanical, fisheries, watershed, and wildlife resources. Opportunities to minimize effects should occur on roads that will remain open to motorized users, along with those to be closed or decommissioned.

Aquatic, Fisheries, Watershed Resources

- Road-related restoration in High Priority Watersheds identified through the WCF, Key Watersheds designated by the NWFP, and Special Emphasis watersheds identified by the LRMP have been minimized.
- Access to municipal watersheds has been limited and road-related effects reduced.

- Effects of the road segments that have a high aquatic risk rating have been minimized.
- All of the barriers to upstream passage of anadromous fish species have been eliminated. Passage for other aquatic organisms has been improved substantially.

Resources

- Effects to segments of road with a high wildlife risk rating have been minimized.
- Impacts and disturbance to special status species and their habitats has been reduced.
- Road densities in watersheds where it was high have declined.
- Roads closed or decommissioned are not a disturbance during critical breeding or rearing periods.
- Roads needed for wildlife administrative purposes or key hunting or viewing areas are reduced in maintenance level and closed by use of barriers that can be opened when needed.
- Consultation complexity of road-related activities decreases and becomes less time consuming.

Botanical Resources

- Road-related impacts to TES plant species and their habitat has been minimized.
- The further spread of non-native invasive plants along the road network is being minimized.

5. Opportunities

Opportunities identified as a result of this analysis of the transportation system on the MTH are intended primarily to be strategic and somewhat programmatic in scope. They are not intended to be overly prescriptive. Rather, they are intended to inform and guide future planning efforts and project implementation.

The MTH should continue to build upon all the work of the past, much of it to minimize effects of the road system on natural resources. The cost associated with maintaining the Forest's system of roads has steadily declined as a result of that past work, and could be expected to also continue. The transportation network currently provides access across the majority (87%) of the miles of road on the Forest. That trend is expected to persist, despite road closures and decommissioning that will occur on select roads. This system will allow travel across the Forest and provide reasonable access to major points of interest and resource management areas. To achieve such a system and meet management objectives, the Forest has identified forest roads likely needed for the future ([Appendix 1](#)).

The process of selecting and managing the network of roads will be fluid and adaptable over time. Roads that are retained for long-term use should be re-evaluated on an "as needed" basis in response to changing budgets, ongoing planning efforts, annual program's of work, and the Forest's management goals and objectives. It is anticipated that the road system will continually evolve and ultimately approach a size that best serves current and future management.

Economic Goal

The MTH needs to continue to reduce maintenance costs to plus or minus 20 percent of the Forest's previous 5-year average appropriation as recommended by Region 6 guidance (Table 31). To do so, the Forest should work towards achieving the Objective Maintenance levels identified in the 1999 ATM (Appendix 4) as the basis for moving toward the economic goal.

Table 31 – Objective ML Budget and the Five Year Average Road Budget Plus or Minus 20 Percent on the MTH (Millions of Dollars).

Objective ML Budget at Culmination	5-YR Average Maintenance Budget	Range	
		-20%	+20%
\$1,573	\$1,138	\$911	\$1,366

That basis should result in:

- Decommission 153 miles of road
- Close to motorized use 614 miles of road
- Little change to the amount of miles serving passenger cars (ML 3-5)
- Amount of miles open to motorized use would decline from 87 percent to about 72 percent

It's anticipated that the timeframe to implement this approach would take about 10 years assuming availability of current funding streams. This should result in a reduction of about 20 percent of the annual maintenance need, a cost savings of approximately \$410 thousand dollars per year over existing. Specified roads identified to be converted to ML 1 or decommissioned are listed in Appendix 9.

At culmination however, achieving the Objective MLs would not be expected to achieve the economic goal directed by the Region. Additional reductions in cost would need to be identified. This Travel Analysis indicates that in addition to the Objective MLs, additional opportunities would need to be pursued to achieve the economic goal.

Evaluation of the 2003 RA ratings suggests that there are about 70 miles of road that have a medium low or low access rating and moderately high or higher aquatic or wildlife risk rating. There also another estimated 566 miles that are rated as having a medium low or low access need and moderately low or low composite resource risk rating. These could be potential opportunities for further road-related restoration work.

Converting these roads from ML 2 to ML1, or decommissioning some of them could potentially result in an estimated \$258,700 additional savings annually. At culmination, this would amount to about \$1.317 million dollars, and be within the target range. It would reduce the projected Objective ML road system from 2,692 miles to 2,126.

Travel Analysis Implementation

By focusing limited road maintenance resources, and any potential capital funds, to the most important roads necessary for management and enjoyment of the National Forest, and to the roads with the highest need for restoration because of high environmental risks the following list is recommended to *guide* planning of road-related project work.

The list is categorized into 5 elements:

- strategic planning
- road maintenance
- road closures and decommissioning
- site-specific planning
- inventory and monitoring

Strategic Planning

1. Roads likely needed for the future are those with an Objective ML 1-5. Roads *not* likely needed for the future are those designated as Objective ML ‘decommission’.
2. Retain for use all segments of objective ML 3 through 5. This accounts for approximately 12 percent (~355 miles) of the existing transportation network of system roads.
3. Retain for use system roads designated as objective ML 2 that have low resource risks but moderate or higher access needs, which is at least an estimated 388 miles.
4. Additional opportunities to reduce annual road maintenance costs should continue to be identified for roads with an Objective ML of 1 and 2.
5. During project-level planning, reexamine objective ML 1 and 2 to see if they remain consistent with program access goals and objectives, as well as resource and economic ones.
6. Continue planning road-related restoration work across the Forest with the Increment process, or as opportunities arise through project planning and annual program of work.
7. Use the Objective Maintenance Levels from the 1999 ATM that are in INFRA along with the resource risk ratings from the 2003 RA as the basis for making site-specific road management decisions.
8. The transportation network on the MTH should support the needs of the general public and support the principle goals and objectives of the recreation, heritage, vegetation management, special uses, and fire programs.
9. During increment or project planning consider whether the Objective Maintenance level road system meets current public access needs. If access needs are not being met adjustments or modifications to the system should be proposed through the NEPA process.
10. Previous formal road-related restoration Decisions are to remain in effect for the term of their NEPA. The TAP is not intended to supersede or reverse prior decisions during their term.
11. Consult with the Confederated Tribes of Warm Springs and Grand Ronde when determining which roads to close or decommission and insure consistency with the Tribal Forest Protection Act.
12. Coordinate with the CTWS and CTGR about the types, locations, and spatial extent of where traditional uses on ceded lands occur and when. Identify access needs to support their use.
13. During project planning, explore reasonable options for reducing or eliminating impacts to aquatic, water, wildlife, and botanical resources.

14. For aquatic and water resources focus road-related restoration in priority watersheds identified by the Watershed Condition Framework, municipal watersheds, Key Watersheds identified by the NWFP, and Special Emphasis watersheds identified by the LRMP.
15. To minimize effects on wildlife prioritize road-related restoration in TES habitats, late-successional reserves, designated critical NSO habitat, occupied nesting sites, inventoried deer and elk summer and winter range, migration routes, special habitats, and watersheds with open road densities exceeding LRMP Standards and Guidelines.
16. Maintain arterial linkages between communities and State and U.S. Highways, as well as the east-west flow of local community and emergency traffic across the Cascade Range.
17. Retain for use all system roads identified as being needed by cooperators and special use permits such as utilities (BPA, PGE, Portland Water Bureau, etc.), concessionaires, and ski areas except those previously designated by the objective ML to change, or that have been included in prior Decisions.
18. Continue to identify roads important for supporting fire suppression and emergency needs, particularly around the Wildland Urban Interface (WUI) and access to private lands (Appendix 7). The Strategic Fuels Treatment Placement Plan should also help to identify where upcoming reduction efforts would need access.
19. Adjust the Objective ML designation on specified system roads to meet changing needs and conditions, particularly those identified in the changed condition analysis (Appendix 10).
20. Maintain access to private lands and retain roads with standing road-use agreements. Retain access to summer homes, trailheads, and developed recreation sites.
21. Retain historic transportation routes.
22. Consider ridgetop roads (ML 2) that have a moderately low or lower resource risk ratings to be the least priority for restoration funding. If they are identified for closure or decommission, then do so passively with the least amount of expenditure. Ridgetop roads could also be beneficial access for other purposes such as firebreaks, lookouts, and viewpoints.
23. Consult with fire suppression cooperators when determining which roads to close or decommission. Identify key water sources and pump chances and maintain road access to them.
24. Roads-to-trail conversions could be considered at the project level if proposed. Conversion of a route would have to meet trail management objectives, provide the desired recreation experience, have adequate funding to convert and maintain for the long-term, and be approved through official disclosure by a NEPA decision.
25. Control the operation of off-highway vehicles by utilizing the Motor Vehicle Use Map regulations.
26. Enhance outreach and scoping efforts during planning of road-related restoration to actively and collaboratively involve citizens, tribal governments, stakeholders with the actions being proposed.
27. Augment standard scoping announcements in neighboring communities and adjacent landowners with widespread notice to connect with resident users.

28. To begin preparing for future climate conditions, begin to identify and record where crossings and culverts are insufficient to pass design flows, or may be undersized. Prioritize for replacement certain culverts under roads that have been identified to be likely needed for the future.
29. Use the TAP report to inform revision of the LRMP to help develop goals and objectives relative to road related concerns for access needs and natural resources.
30. Prescribe Best Management Practices (BMPs) from the National Core Technical GUIDE when planning road-related restoration.

Road Maintenance

1. The Forest's primary arterial routes should be maintained at a high level for quick response of emergency vehicles of all sizes and visibility for safe travel. If budget shortfalls limit maintenance of the primary arterials to standard, consider site-specific maintenance as problems arise.
2. Prioritize available maintenance and capital funding and resources on the ML 3-5 roads where user safety concerns are known to exist, and then secondly where access needs were identified by the 2003 RA as being high and risks to resources were identified as being also high (estimated to be at least 125 miles).
3. Identify and schedule maintenance needs to access developed recreation sites. Prioritize them based upon the intensity of use and the types. For example, roads that access wilderness trailheads often need maintenance to accommodate hikers and horses (i.e., turn-around and clearance for trailers)
4. Continue to look for ways to reduce maintenance costs, and overhead costs related to Forest Service road programs, so as to direct more funds directly to road maintenance and improvement work.
5. Seek new and additional funding sources for road maintenance and improvements through any available funding programs such as Capital Investment Programs, Legacy Roads and Trails, Forest Highway Programs, etc.
6. Include priority road repair needs or capital improvements in the Forest's Integrated Planning strategy to help identify where overlapping objectives could be achieved using generated revenue.
7. Seek partnership opportunities to help leverage funds with outside sources for road maintenance and repair, particularly user-groups experienced gaining access to competitive grant dollars.
8. Conduct yearly inventory of annual and deferred maintenance needs of the primary arterial routes. Prioritize road maintenance needs on them to ensure resource protection and user safety.
9. Ensure that commercial users perform, or deposit funds, for road maintenance work commensurate with their use.
10. Seek additional funding for road maintenance through regular appropriations.

11. Wherever possible, transfer maintenance jurisdiction of an NFS road and associated transportation facilities (FSM 7705) to another authority, particularly if:
 - More than half the traffic on the road is unrelated to administration and use of NFS lands.
 - The road is necessary for mail, school, or other essential local governmental purposes.
 - The road serves year-long residents within or adjacent to NFS lands.
12. Prioritize repair and upgrade of culverts based on risk of failure and impact to fish passage and other aquatic resources as identified by the 2003 RA or subsequent analyses.
13. Prescribe and implement BMPs from the National Core Technical Guide that will minimize effects to water resources. Include them as is feasible in contracts and technical specifications as requirements of the work.
14. Prescribe and implement BMPs, such as equipment washing to prevent further spread of non-native invasive plants when conducting maintenance activities. Include them as is feasible in contracts and technical specifications as requirements of the work.

Road Closures and Decommissioning

1. Prioritize funding for roads to be closed or decommissioned based on those with the highest environmental risks and the lowest access needs as identified by the 2003 RA (estimated to be at least 70 miles, Appendix 11).
2. Seek partnership opportunities to help leverage funds with outside sources.
3. Favor road closures and storm proofing over decommissioning (unless already decommissioned or under prior decision to decommission) when any future access need has been identified (i.e., previously managed stands, forest health, or other land allocation goal) and the risk to resources is moderate to low.
4. Favor road closures and storm proofing over decommissioning (unless already decommissioned or under prior decision to decommission) in matrix land allocations and on the east zone of the Forest where the fire regime is more frequent of a disturbance.
5. Ensure that roads scheduled for decommissioning are truly not needed again for future use. Do not expect to use them again as “temporary roads” in the future.
6. Close roads not needed in the near-term (10 years), but are likely to be needed in the long-term. Gated roads and roads that are storm-proofed and allowed to grow-in are at a much lower risk for weed invasion and transport than maintained roads.
7. To minimize expenditure, favor passive closure or decommissioning for roads that have an objective ML 1 or decommission, have yet to be treated, and are a low risk to resources.
8. Use BMPs from the National Core Technical Guide to close, stormproof, or decommission a road.
9. Determine the presence of non-native invasive plants on roads designated for closure or decommissioning and identify potential methods and effectiveness for eradication.
10. Use the guide for Road Closure and Obliteration in the Forest Service to help plan project specifics (Moll 1996)

Site-Specific Planning

1. Identify roads that pose high risk of impact to natural resources. Close, decommission or stabilize them. Seek alternative routes where possible. Prioritize:
 - Mid-slope roads
 - Roads with a high risk of landslides
 - Roads adjacent to low-gradient streams and floodplains
 - Reduce or eliminate disturbance and impacts to TES fish
2. Consider the following factors in determination of impacts on fish and other aquatic resources:
 - Type, condition, and number of stream crossings at a road-segment scale.
 - Road-segment interaction with a stream's floodplain, where the road is parallel to the stream.
 - Road surface type.
 - Culvert fill-failure risk.
 - Sustained steep (>15%) road grades in excess of 500 feet.
 - Percent of road with sideslopes >51%.
 - Maintenance record (date, type), including knowledge of site-specific chronic or severe maintenance sites should be documented.
 - Documentation of known spawning reaches with review by state and other agency biologists.
3. Minimize disturbance to fish, wildlife, and botanical resources by:
 - Closing or restricting access to roads used intermittently for forest management activities
 - Decommissioning unneeded roads identified by a local interdisciplinary team
 - Minimizing the effect of noise from road maintenance, reconstruction or decommissioning by managing the seasonal and hourly operating periods of projects
4. Provide temporary drainage such as waterbars for wet areas (*e.g.*, seeps, springs). Reestablish natural drainage prior to road closure. Disconnect as much as is feasible road segments from the stream network.
5. Where fish passage is affected, use an interdisciplinary process in the design of culverts (*e.g.*, fisheries biology, engineering, geomorphology, hydraulics, and hydrology).
6. Roads that will be decommissioned should be used for silvicultural treatment prior to decommissioning.

7. Determine BMPs from the National Core Technical Guide to be implemented at individual project sites and encourage that they be specified as is feasible in technical specifications or contracts.
8. Specify in detail the methods to be implemented on individual project sites to minimize the effects to aquatic, water, soil, wildlife, and botanical resources during implementation, and to prevent the further spread or introduction of non-native invasive plant and aquatic species.

Inventory & Monitoring

Inventory:

- Update the INFRA road database when a Decision that includes road-related projects is signed. Double check the current database and insure that data for individual roads is accurate or updated according to recent Decisions of Increment 2 (Appendix 10a), Grove, Goat, and Polallie. Insure also updates to INFRA after future Decisions are signed.
- Roads included in land exchanges will need to be added to, or removed from INFRA too. A recent land exchange with Sportsman's Paradise on the Barlow District has yet to be inventoried and surveyed for the new roads transferred to the Forest in the lands it acquired. Upcoming land exchanges being proposed involve Mt. Hood Meadows at Government Camp, and the City of Portland Water Bureau in the Bull Run watershed.
- Conduct road condition inventories as opportunities present themselves during planning to identify needs or opportunities for minimizing effects to natural resources. Utilize when possible volunteers and stakeholders to assist with condition inventories to foster better relationships with forest users.
- Continue to inventory and survey stream crossings (*i.e.*, culverts) to identify barriers or opportunities for restoration. Prioritize repair and upgrade based on risk of failure and impact to fish passage and other aquatic organisms.
- Annually update non-native invasive plant inventories particularly on the Forest road system. Maintain a current GIS inventory layer available for use by project planners and implementation personnel. Identify locations where road-side mowing would be a high risk of transferring non-native invasive plants further.
- Track temporary road locations, construction, and decommissioning or obliteration. This information is required in ESA consultation, but is not currently tracked in the Forest road INFRA database.

Monitoring:

- Continue to include road-related BMP protocols in the monitoring targets and report the findings as directed by the National Core Program. Implement adaptive management as needed to improve effectiveness of BMPs to protect water resources.
- Continue to report Forest-wide system road miles, open road miles, closed (stored) road miles and road miles decommissioned in annual monitoring and evaluation reports.

- Periodically survey or monitor the effectiveness of replacing barriers to aquatic organisms and other road-related restoration to observe their response and recovery, particularly after storm events.
- Periodically observe the effectiveness of road-related restoration to minimize effects to wildlife and botanical resources, and the spread of non-native invasive species.

Glossary

Road terms are defined in FSM 7705 (USDA 2001b). Some terminology has been updated, and is therefore different than that described in the 1994 ATM Guide in Appendix B.

Bridge - A road or trail structure, including supports, erected over a depression or an obstruction, such as water, a road, a trail, or railway, and having a deck for carrying traffic or other loads.

Closed Roads - A road on which traffic has been excluded by natural blockage, barricade, regulation, or by obscuring the entrance. A closed road is still an operating facility on which traffic has been removed (year-long or seasonal) and remains a national forest system road.

Debris Flow - A debris flow is a highly mobile slurry of soil, rock, vegetation, and water that can travel thousands of yards from its point of initiation and usually occurs in steep (greater than approximately 6 degrees) and confined mountain channels. Debris flows are initiated by liquefaction of landslide debris concurrently with failure or immediately thereafter as the soil mass and reinforcing roots break up. Erosion of additional sediment and organic debris in small and steep channels can increase the volume of the original landslide by 1000% or more, enabling debris flows to become more destructive as their volumes increase with distance traveled.” (Benda Unknown)

Designated road, trail or area - A National Forest System road, a National Forest System trail, or an area on National Forest System lands that is designated for motor vehicle use pursuant to Section 212.51 on a motor vehicle use map (36 CFR 212.1).

Forest road or trail - A road or trail wholly or partially within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources (36 CFR 212.1).

High Clearance Road - Suitable for standard pick-up truck travel

Low Clearance Road - Suitable for passenger car travel

Forest transportation facility - A Forest road or trail or an airfield that is displayed in a forest transportation atlas, including bridges, culverts, parking lots, marine access facilities, safety devices, and other improvements appurtenant to the forest transportation system (36 CFR 212.1).

Forest transportation system - The system of National Forest System roads, National Forest System trails, and airfields on National Forest System lands

Forest transportation system management - The planning, inventory, analysis, classification, recordkeeping, scheduling, construction, reconstruction, maintenance, decommissioning, and other operations undertaken to achieve environmentally sound, safe, cost-effective, access for use, protection, administration, and management of national forest system lands.

Grade dip - A shallow, long, rolling dip in the road surface that intercepts surface water running on the road and in the road ditch and then deposits it over the outside edge of the road.

Interstitial - Small, narrow spaces between gravel particles.

Maintenance Level 1 - These are roads that have been placed in storage between intermittent uses. The period of storage must exceed 1 year. Basic custodial maintenance is performed to prevent damage to adjacent resources and to perpetuate the road for future resource management needs. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate" all traffic. These roads are not shown on motor vehicle use maps.

Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic but may be available and suitable for non-motorized uses.

Maintenance Level 2 - Assigned to roads open for use by high clearance vehicles. Passenger car traffic, user comfort, and user convenience are not considerations. Warning signs and traffic control devices are not provided with the exception that some signing, such as W-18-1 "No Traffic Signs," may be posted at intersections. Motorists should have no expectations of being alerted to potential hazards while driving these roads. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to:

- a. Discourage or prohibit passenger cars, or
- b. Accept or discourage high clearance vehicles.

Maintenance Level 3 - Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. The Manual on Uniform Traffic Control Devices (MUTCD) is applicable. Warning signs and traffic control devices are provided to alert motorists of situations that may violate expectations.

Roads in this maintenance level are typically low speed with single lanes and turnouts. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users.

Maintenance Level 4 - Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. Manual on Uniform Traffic Control Devices is applicable. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.

Maintenance Level 5 - Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. Manual on Uniform Traffic Control Devices is applicable. The appropriate traffic management strategy is "encourage."

National Forest System Road - A forest road other than a road which has been authorized by a legally documented right-of-way held by a State, county or other local public road authority (36 CFR 212.1).

Open Roads - A national forest system road open for vehicular use (e.g., passenger cars, pickup trucks and commercial vehicles). National forest system roads are subject to administrative, seasonal, temporary, or permanent closure.

Public Roads - Any road or street under the jurisdiction of and maintained by a public authority and open to public travel (23 U.S.C. 101(a)).

Riprap - Foundation or wall of broken rock used to armor shorelines, streambeds, bridge abutments, pilings and other shoreline structures against scour, water or ice erosion.

Road - A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212.1).

Road Construction or Reconstruction - Supervising, inspecting, actual building, and incurrence of all costs incidental to the construction or reconstruction of a road (36 CFR 212.1)

Road Decommissioning - Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1).

Road Maintenance - The upkeep of the entire forest transportation facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization (36 CFR 212.1).

Roads subject to the Highway Safety Act - National forest system roads that are open to use by the public for standard passenger cars. This includes roads with access restricted on a seasonal basis and roads closed during extreme weather conditions or for emergencies, but which are otherwise open for general public use.

Stabilization - A process to slope, dip and waterbar travelways to reduce run-off concentrations and alleviate risk of erosion and landslides, should designed drainage structures fail to cant' storm event. This also includes grass seeding slopes. Unstable fill embankments that exceed the required travelway may be partially or fully removed.

Temporary road or trail - A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not included in a forest transportation atlas (36 CFR 212.1).

Unauthorized road or trail - A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas (36 CFR 212.1).

Waterbar - Berm or ditch and beret combination that cuts across roads (and trails) at an angle so that all surface water running on the road and in the road ditch is intercepted and deposited over the outside edge of the road. These normally allow high clearance vehicles to pass.

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